Natural Environment Research Council

Dunstaffnage Marine Laboratory
Marine Physics Group
P.O.Box 3
Oban
Argyll
PA34 4AD

Tel: 0631-62244
FAX: 0631-65518

R.R.S. Challenger Cruise 97/92
Oban to Oban
September 25th to October 6th 1992

Cruise Report
Anton Edwards
6th October 1992

Natural Environment Research Council

Dunstaffnage Marine Laboratory
Marine Physics Group
P.O.Box 3
Oban
Argyll
PA34 4AD

Tel: 0631-62244
FAX: 0631-65518

R.R.V. Challenger Cruise 97/92
Oban to Oban
September 25th to October 6th 1992

Cruise Report
Anton Edwards
6th October 1992

Staff

A. Edwards DML (PSO)
J. M. Graham DML
N. MacDougall DML
S. M. Harvey DML
C. R. Griffiths DML
D. Harris DML
J. Pates SURRC

DML Dunstaffnage Marine Laboratory
SURRC Scottish Universities Research Reactor Centre

Aims

1). To collect Conductivity - Temperature - Depth (CTD) profiles and large volume water samples at standard positions between the Sound of Mull and the shelf edge West of Barra for radiocaesium studies.

2). To service the DML current meter mooring in the Tiree Passage.

3). To work the CTD stations of the Anton Dohrn seamount section between the shelf-edge and Rockall to continue the Rockall Trough time series as a contribution to WOCE goal 2.

4). To work the Rockall to Malin Head CTD section for further investigation of recent water mass changes west of Britain.

5). To work shelf CTD sections in the Sea of the Hebrides and the North Channel as time permits.

6). To collect large volume water samples west of the Hebrides and samples for iodine concentration determination.

Narrative

"Challenger" sailed from Oban Railway Pier in calm weather at 1400Z on the 25th September and headed for the mooring in the Tiree Passage via the Sound of Mull. The mooring was grappled soon after 1800 and successfully relaid by 1900Z. The ship then steamed to station C1 to start the programme of CTD dips, water sample collection and Craib coring. The day finished, still calm, as the ship arrived at C2. Saturday 26th was a day with only light airs and conditions remained bright and good for coring, water sampling and CTD work throughout the day. The shelf edge was reached around midnight at station P. Stations O and N were worked in the early hours of Sunday 27th and most of the daylight hours were then spent near station M, testing deep buoyancy, working the CTD and at the same time testing an acoustic release, laying a WOCE mooring with a SEACAT recorder and a thermistor chain and finally coring successfully with the Craib corer in a water depth of about 2200 metres. Light airs persisted throughout the day, accompanied by a low swell. The vessel then made for the remaining stations on the line towards the Anton Dohrn seamount and Rockall. During the 28th, the weather deteriorated, and by late afternoon was force 5 or 6 Southeasterly. Work continued and Rockall was reached in the late evening.

A line of stations RW1 to RW5 was then started but had to be abandoned in worsening weather after RW2.

The ship remained hove-to during a violent storm (the remains of Hurricane Charlie) that lasted until the late afternoon of the 29th when, with similar weather forecast for the Rockall area, course was set at 1800Z for the nearest shelter at the Sound of Mull. Conditions improved eastwards and, as Barra was reached at dusk, course was changed so as to start the P line of CTD stations from Skerryvore to Islay. Conditions remained calm and the C line was started in the morning of October 1st. At the end of this line, course was set for the D line west of Islay. A diversion to Ayr commenced about 1500 Z in order to allow the chief engineer to leave the ship for domestic reasons.

Station work recommenced in the early morning of the 2nd October at the Islay end of the D line. It was discovered that the bulkhead connector to the SeaBird CTD had been damaged by tracking under the tail connector of the CTD winch wire. This was remedied and the CTD system performed satisfactorily thereafter. The end of line D was finished in rather lumpy conditions and the ship steamed north along the edge of the continental shelf to start line Q directly eastwards to Skerryvore. As the swell died and skies cleared, Skerryvore was reached in the late afternoon of the 3rd October and, in good conditions, after working lines P and C southwards to Antrim, we sailed into the North Channel area in the morning of the 4th October.

With North channel CTD lines A, Y and Z complete by evening, the ship reached the Clyde Sea stations very early on the 5th and worked clockwise round Arran to finish at CL14 in the late morning. In view of the discovered positions of the coastal salinity front on lines P,D, and C, the remaining working time was spent on a line IS designed to cross the front twice more from Antrim to Skerryvore. The weather remained calm throughout. The ship docked at Oban at 0800BST on the 6th October.

Equipment

Ship's Gear

Most gear worked satisfactorily throughout the cruise. Two particular items deserve attention from NERC's Research Vessel Services (RVS) at Barry:

1). This comment was made at the end of cruise 86/91 and is as relevant now as it was then: It is inconvenient that the Simrad Echo sounder cannot be triggered with a selectable delay relative to a standard clock. Could this be done, it would be easier to find the trace of pingers used to monitor the approach of equipment to the sea-bed.

2). The CTD wire metering gear was unreliable and worked intermittently. Some difficulty and risk was experienced because of not knowing gear depth. Without any maintenance manuals aboard it was not possible to cure this intermittent fault. It is a matter of urgency that this be rectified very soon.

DML/WOCE Seabird CTD

The WOCE CTD system on most occasions logged successfully, with no perceived faults in the data stream. There were occasional system hang-ups that required a restart.

Results

The results are summarised in the following figures and tables:

1). The tracks of WOCE and shelf sections are shown in figure 1. The (uncalibrated) oceanographic sections of temperature, salinity and density resulting from these measurements are shown in figures 2 to 40.

2) All required large volume water samples at the standard positions between the Sound of Mull and the shelf edge West of Barra were obtained for radiocaesium studies.

3). The DML current meter mooring in the Tiree Passage was recovered and relaid successfully.

4). Large volume water samples west of the Hebrides were successfully obtained, together with occasional samples for iodine concentration determination.

Moorings

Tiree Passage Mooring Details

The mooring at 56° 37.4'N 6° 24.1'W was relaid at 1855Z on the 25th September 1992 with two Aanderaa meters recording at 60 minute intervals: No. 10211 (RCM7) at 22m over bottom; and No. 6979 (RCM5) at 11m over bottom. The depth at this position was 42m.

Mooring at M details

The instrumentation on the mooring at M comprised a 50m thermistor chain and SEACAT logger at a depth of about 400m in a water depth of 2236m. An acoustic release was fitted and therewas intermediate buoyancy of three benthos spheres at 100m and 1100m above the seabed. The mooring was deployed at 1519Z on the 27th September 1992.

Acknowledgements

The cooperation of the captain, Peter Maw, the officers and crew of the Challenger was very much appreciated. This cruise was supported by the Ministry of Agriculture, Fisheries and Food and by the Natural Environment Research Council as part the WOCE and LOIS programmes.

"Challenger" Cruise 97/92: Stations List

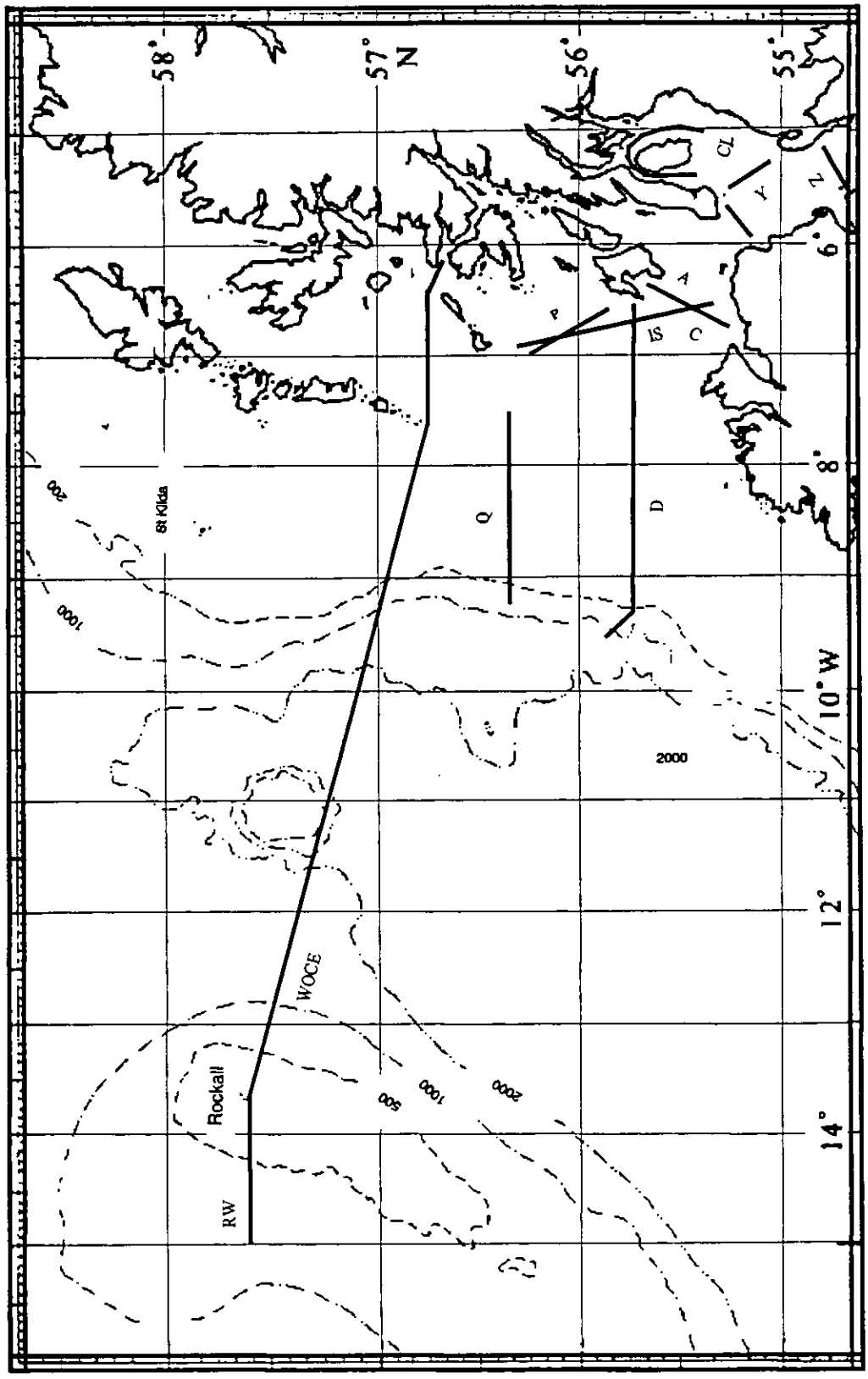
The CTD depth shown is derived from the sounding and pinger height over the bottom.

SS *denotes a surface salinity only was taken.*
* *a 1 litre surface sample for iodine analysis was taken.*
\# *a surface sample for SURRC ^{234}Thorium analysis was taken.*

Station	Disc /Dip	Lat. °.'N	Long. °.'W	Date/ Time Z	Depth,m	CTD depth	Cs Samples Sur Mid Bot
				25/9			
C1/1G	**1**/001	56.40	6.08	2030	187	170	501 251 251
C2/2G	**1**/002	56.41	6.17	2238	040	030	501 251 251
				26/9			
/3G	SS	56.42	6.22	0005	-	-	- - -
C3/4G	**1**/003	56.44	6.27	0032	88	82	501 251 251
/5G	SS	56.44	6.36	-	-	-	- - -
C4/6G	**1**/004	56.44	6.45	0246	39	30	501 - 251
C5/7G	**1**/005	56.44	7.00	0352	140	132	501 251 251
/8G	-	56.44	7.10	-	-	-	- - -
C6/9G #	**1**/006	56.44	7.20	0651	161		501 251 251
10G	**1**/007	56.44	7.30	0855	217	211	- - -
C7/11G#	**1**/008	56.44	7.40	0948	55	42	501 251 251
/12G	-	56.45	7.50	1040	-	-	- - -
C8/13G	**1**/009	56.47	8.00	1115	124	118	501 251 251
/14G	-	56.48	8.10	1210	-	-	- - -
T	**1**/010	56.50	8.20	1251	133	128	- - -
C9/15G	**1**/011	56.53	8.30	1357	128	123	501 251 251
S	**1**/012	56.57	8.47	1548	129	125	- - -
C10	**1**/013	57.00	9.00	1654	136	130	501 251 251
/16G/R	-						end samples
Q #	**1**/014	57.03	9.13	2248	324		
P	**1**/015	57.06	9.25	2308	960		
				27/9			
O	**2**/016	57.09	9.42	0313	1930	1918	
N #	**3**/017	57.14	10.03	0539	2115	2105	#
M *	**4**/018	57.18	10.23	0851	2211	2205	
L	**4**/019	57.22	10.40	1940	2095	2085	
K *	**4**/020	57.24	10.52	2153	790	780	
J	**4**/021	57.27	11.05	2348	590	570	
				28/9			
I	**5**/022	57.28	11.19	0106	752	742	
H	**5**/023	57.29	11.32	0249	2023	2012	
G	**6**/024	57.29	11.51	0623	1798	1788	
F	**7**/025	57.30	12.15	0945	1812	1802	
E	**8**/026	57.32	12.38	1227	1660	1650	
D	**8**/027	57.32	12.52	1500	1058	1043	Samples for
C	**9**/028	57.33	13.00	1654	298	293	SURRC, 101,
B * #	**9**/029	57.44	13.20	1831	179	170	< 180/150/100
A	**9**/030	57.35	13.28	2106	113	107	/50/surface

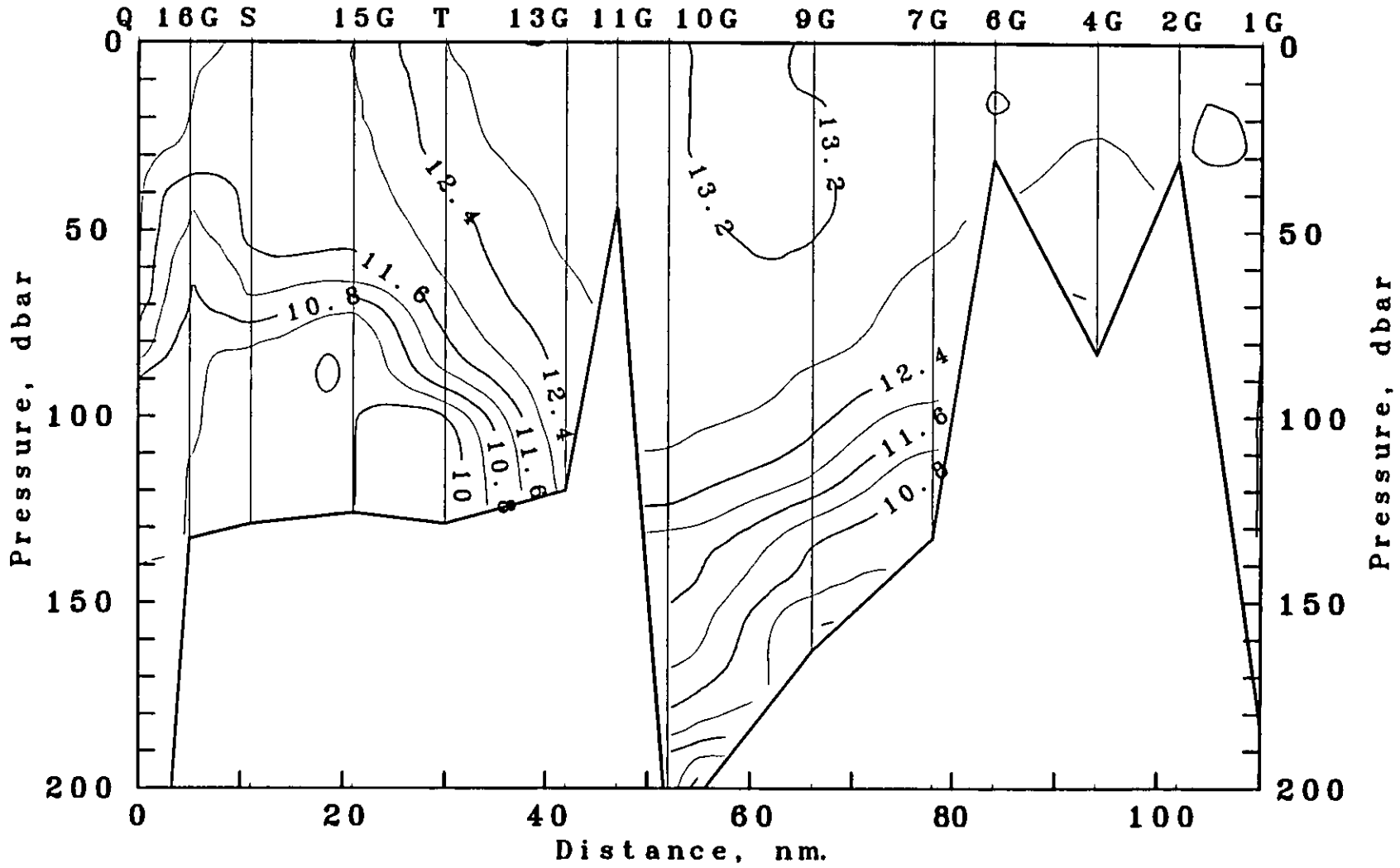
Station	Disc /Dip	Lat. °.'N	Long. °.'W	Date/ Time Z	Depth,m	CTD depth	Cs Samples Sur Mid Bot
RW1	10/031	57.30	14.00	2312	146	136	
				28/9			
RW2	10/032	57.27.5	14.30	0143	240	234	
				30/9			
P1	11/033	56.17	7.05	2310	86	76	
P2	11/034	56.13	6.59	2358	76	68	
				1/10			
P3	11/035	56.09	6.53	0047	68	64	
P4	11/036	56.05	6.47	0137	50	46	
P5	11/037	56.01	6.41	0223	60	55	
P6	11/038	55.57	6.35	0309	53	45	
P7	11/039	55.53	6.29	0356	30	21	
7C	11/040	55.42	6.22	0733	22	15	
6C	11/041	55.37	6.26	0819	80	70	
5C	11/042	55.33	6.30	0917	101	90	
4C	11/043	55.28	6.33	1009	97	87	
3C	11/044	55.23	6.37	1101	95	85	
2C	11/045	55.19	6.41	1158	75	65	
1C	11/046	55.14	6.45	1307	25	20	
				2/10			
8D	11/047	55.46	6.30	0600	34	29	
7D	11/048	55.46	6.37	0635	60	53	
6D #	11/049	55.46	6.46	0724	46	38	
5D	11/050	55.46	6.55	0814	48	42	
4D #	11/051	55.46	7.04	0901	51	45	CTD tail
3D	11/052	55.46	7.16	1012	63	56	failing:
2D #	11/053	55.46	7.29	1137	58	48	<incomplete
1D	11/054	55.46	7.41	1404	85	77	data file
0D	11/055	55.46	8.00	1544	104	97	
99D	11/056	55.46	8.30	1800	112	104	
98D #	11/057	55.46	6.30	2019	126	118	
CS	11/058	55.47	9.16	2150	151	144	
DS	12/059	55.52	9.27	2317	920	900	
				3/10			
Q8	13/060	56.20	9.15	0322	1000	983	
Q7	13/061	56.20	9.00	0606	145	140	
Q6	13/062	56.20	8.45	0721	143	135	
Q5	13/063	56.20	8.30	0831	155	147	
Q4	13/064	56.20	8.15	1017	158	148	
Q3	13/065	56.20	8.00	1132	183	178	
Q2	13/066	56.20	7.45	1254	180	175	
Q1	13/067	56.20	7.30	1412	155	153	
P1	13/068	56.17	7.05	1606	87	79	
P2	13/069	56.13	6.59	1652	77	71	
P3	13/070	56.09	6.53	1743	67	65	
P4	14/071	56.05	6.47	1833	53	47	
P5	14/072	56.01	6.41	1927	63	55	
P6	14/073	55.57	6.35	2018	55	48	
P7	14/074	55.53	6.29	2106	31	24	

Stat -ion	Disc /Dip	Lat. °.'N	Long. °.'W	Date/ Time Z	Dep- th,m	CTD depth	Cs Samples Sur Mid Bot
7C	14/075	55.42	6.22	2345	24	20	
				4/10			
6C	14/076	55.37	6.26	0033	75	70	
5C	14/077	55.33	6.30	0120	95	87	
4C	14/078	55.28	6.33	0211	92	87	
3C	14/079	55.23	6.37	0300	101	92	
2C	14/080	55.19	6.41	0345	77	70	
1C	14/081	55.14	6.45	0434	27	22	
5A	14/082	55.09	6.00	0759	75	68	
4A	14/083	55.11	5.56	0829	142	136	
3A	14/084	55.13	5.52	0907	116	109	
2A	14/085	55.15	5.47	0949	125	120	
1A	14/086	55.17	5.43	1031	31	24	
5Y	14/087	55.13	5.38	1115	82	74	
4Y	14/088	55.09	5.32	1201	108	98	
3Y	14/089	55.05	5.26	1250	90	85	
2Y	14/090	55.01	5.20	1338	92	82	
1Y	14/091	54.57	5.14	1422	50	45	
1Z	14/092	54.40	5.30	1536	26	20	
2Z	14/093	54.42	5.25	1603	124	117	
3Z	14/094	54.43	5.20	1638	280	271	
4Z	14/095	54.45	5.15	1728	154	149	
5Z	14/096	54.46	5.10	1804	114	109	
6Z	14/097	54.48	5.05	1836	38	30	
CL14	14/111	55.21	5.04	2250	57	50	
CL13	14/110	55.26	5.02	2335	122	112	
				5/10			
CL12	14/109	55.31	4.59	0032	103	90	
CL11	14/108	55.36	4.59	0124	141	136	
CL10	14/107	55.40	5.04	0218	159	149	
CL9	14/106	55.44	5.11	0310	165	155	
CL8	14/105	55.48	5.15	0400	162	158	
CL7	14/104	55.43	5.19	0452	118	114	
CL6	14/103	55.39	5.26	0540	144	137	
CL5	14/102	55.35	5.25	0629	137	131	
CL4	15/101	55.31	5.26	0713	80	73	
CL3	15/100	55.26	5.26	0756	43	38	
CL2	15/099	55.21	5.22	0842	47	42	
CL1	15/098	55.17	5.17	0924	48	43	
IS1	15/113	55.30	6.39	1441	70	63	
IS2	15/114	55.35	6.40	1532	93	87	
IS3	15/115	55.42	6.43	1641	57	53	
IS4	15/116	55.49	6.45	1743	50	45	
IS5	15/117	55.55	6.48	1837	46	42	
IS6	15/118	56.02	6.51	1931	55	51	
IS7	15/119	56.09	6.54	2027	50	44	
IS8	15/120	56.16	6.57	2117	71	66	



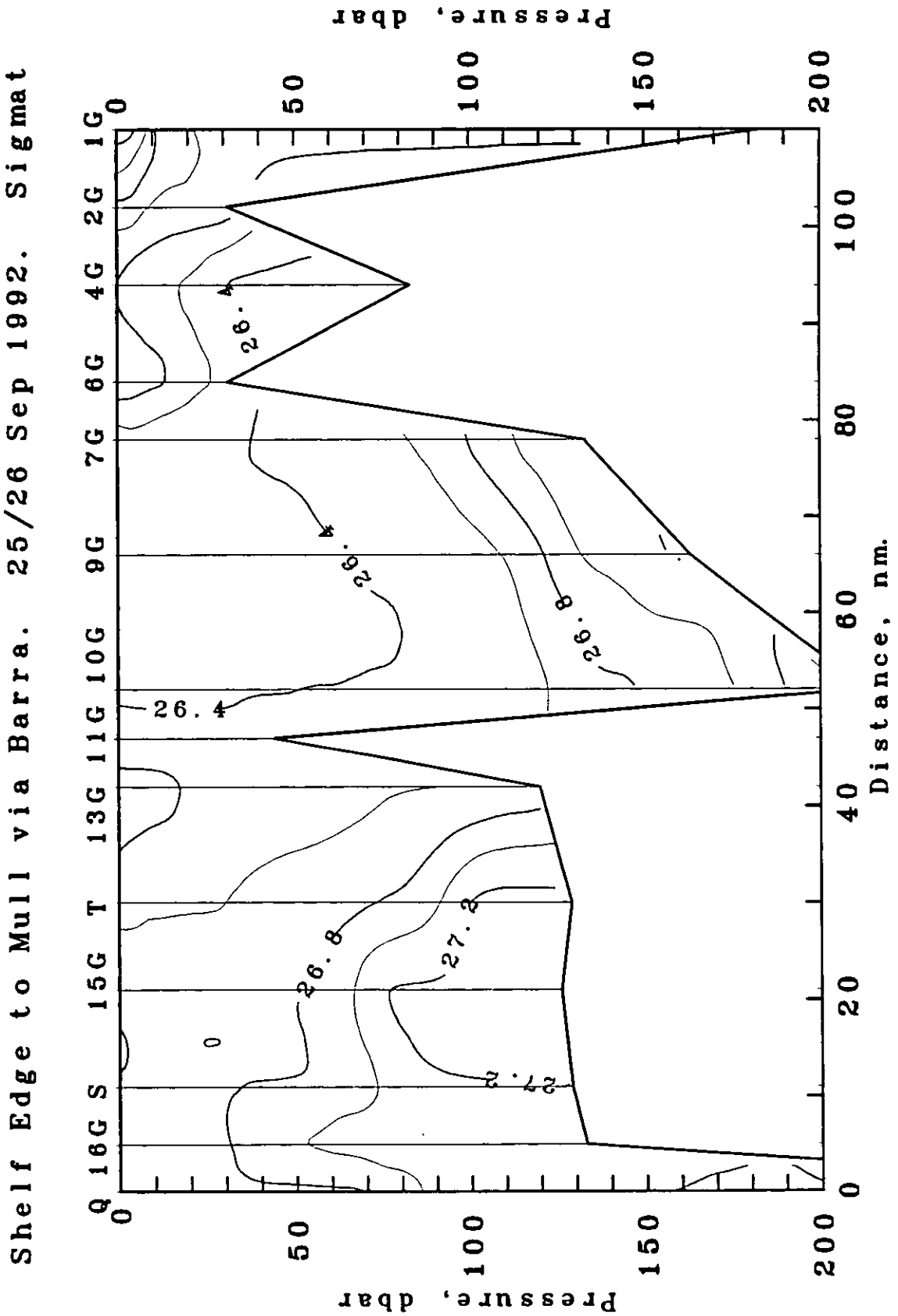
Challenger Cruise 97/92: 25th September to 6th October 1992

Figure 1

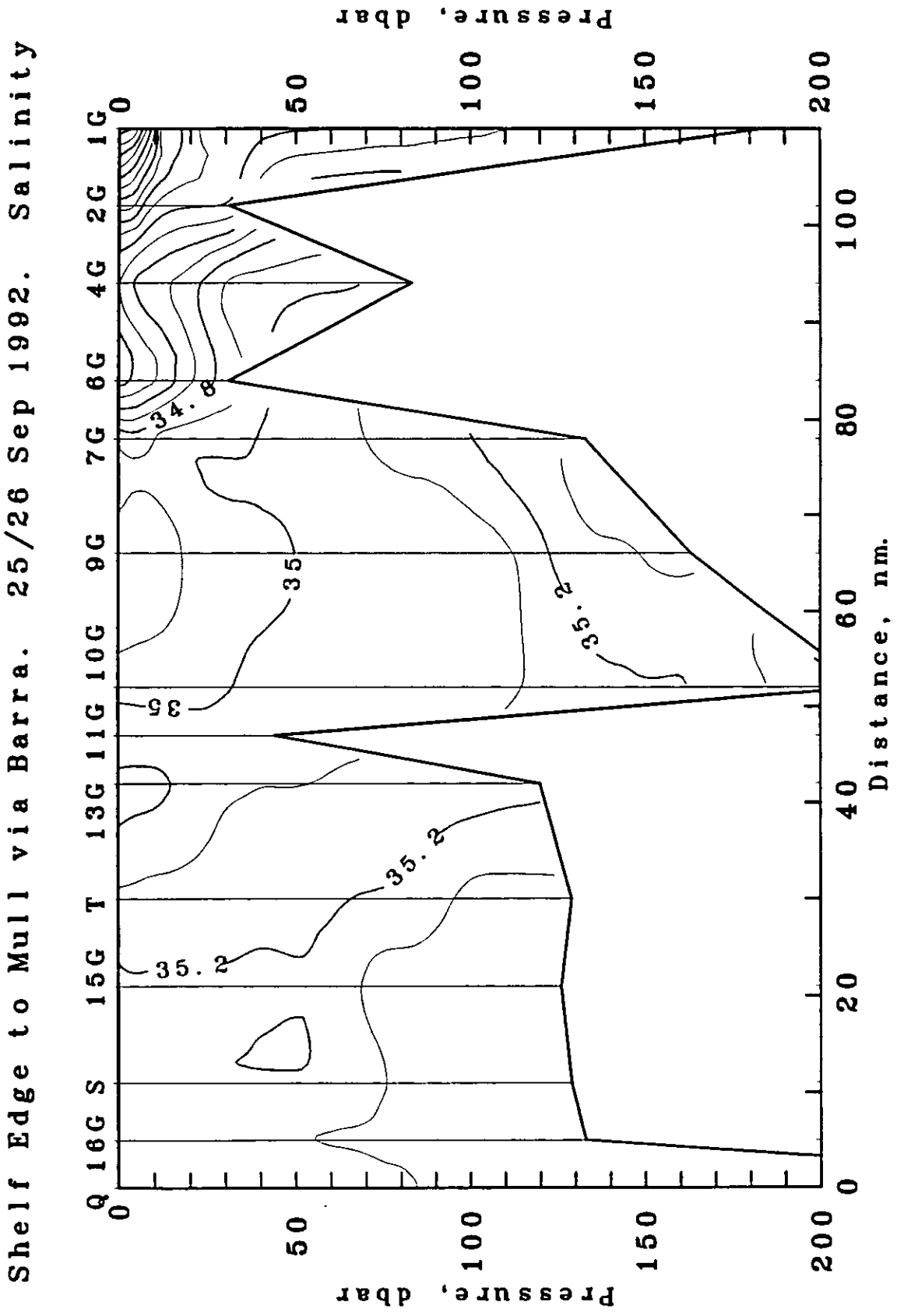


Section from uncalibrated Seabird CTD

Figure 2

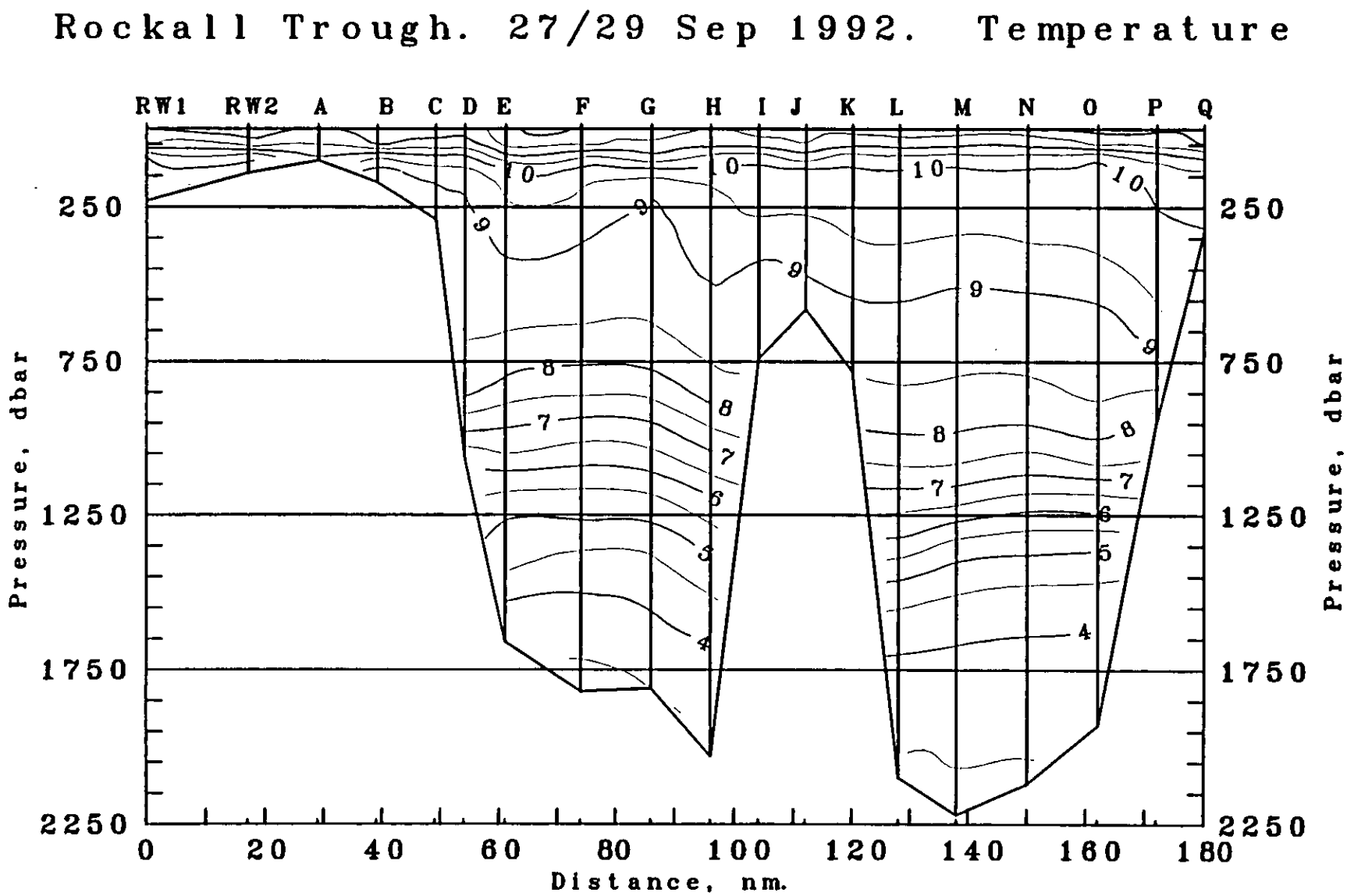


Section from uncalibrated Seabird CTD Figure 3



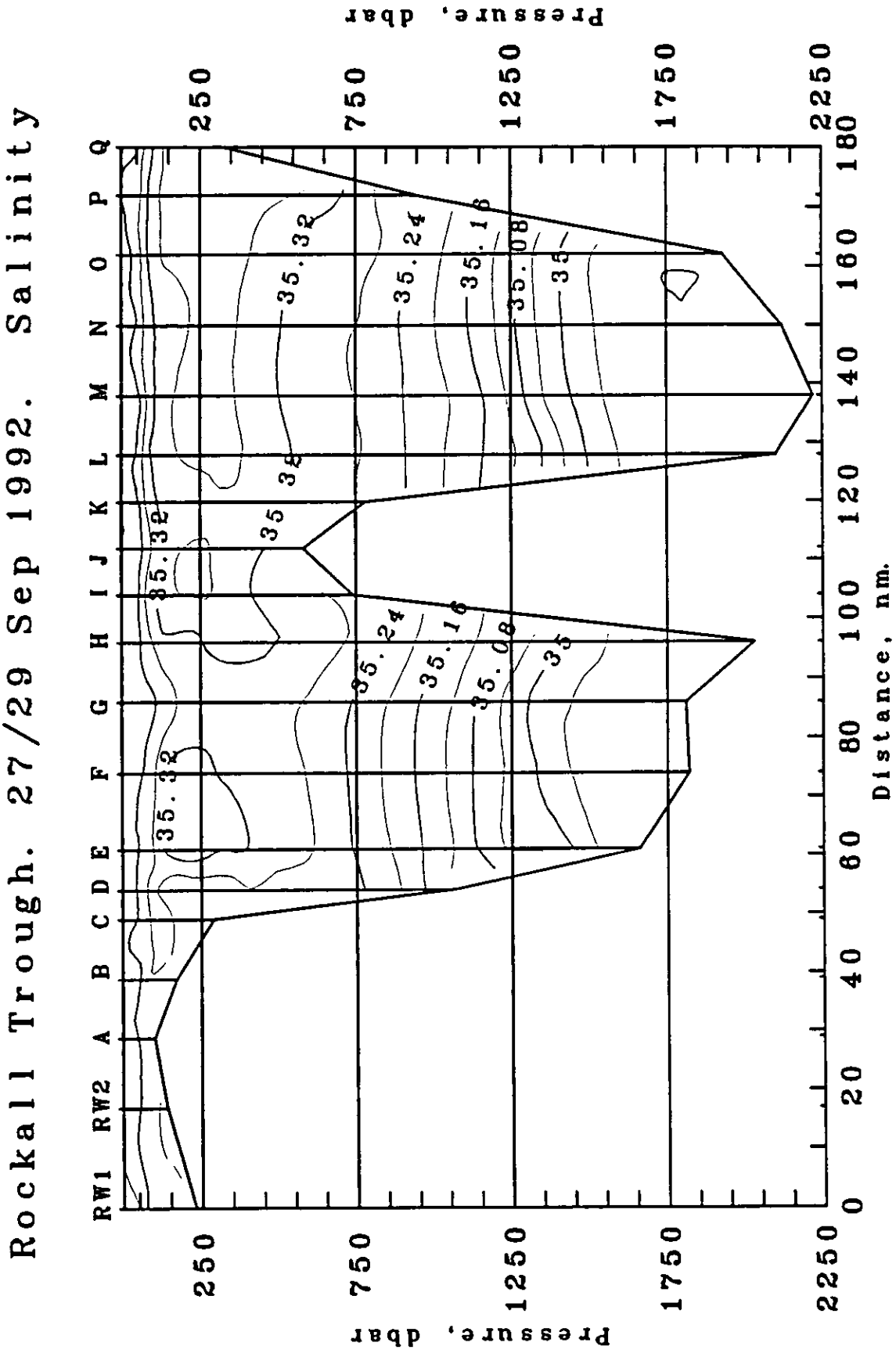
Section from uncalibrated Seabird CTD

Figure 4



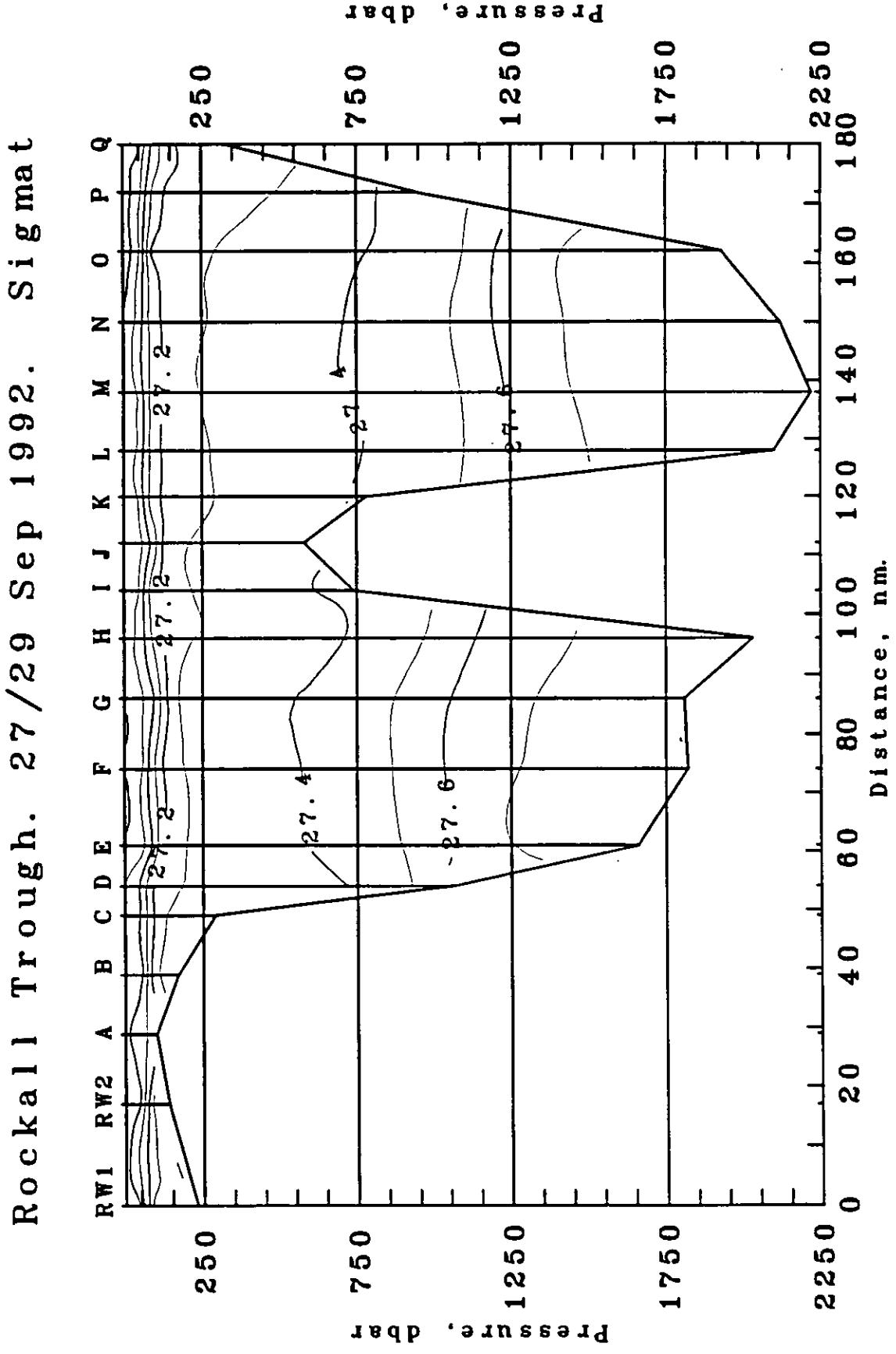
Section from uncalibrated Seabird CTD

Figure 5



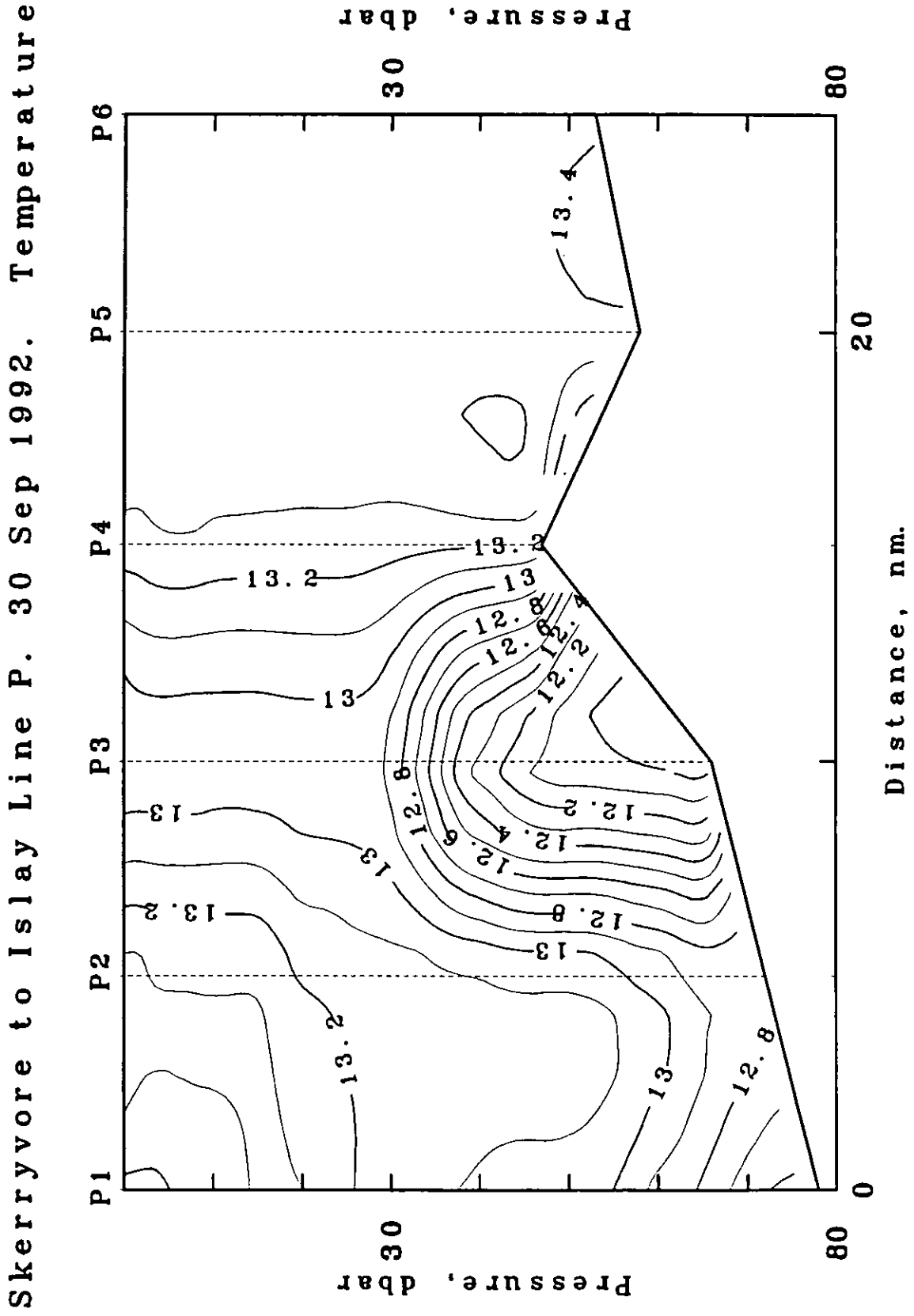
Section from uncalibrated Seabird CTD

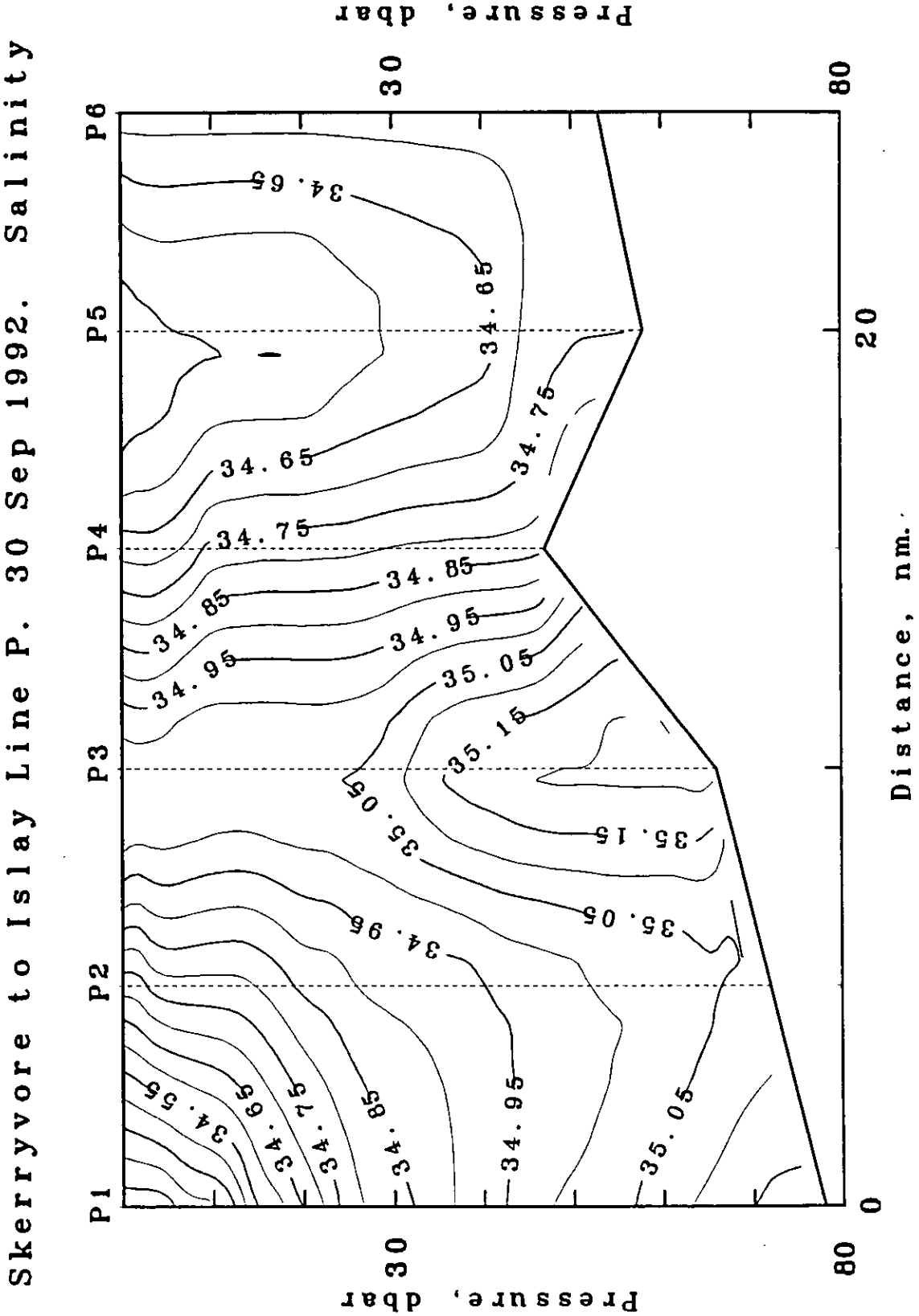
Figure 6



Section from uncalibrated Seabird CTD

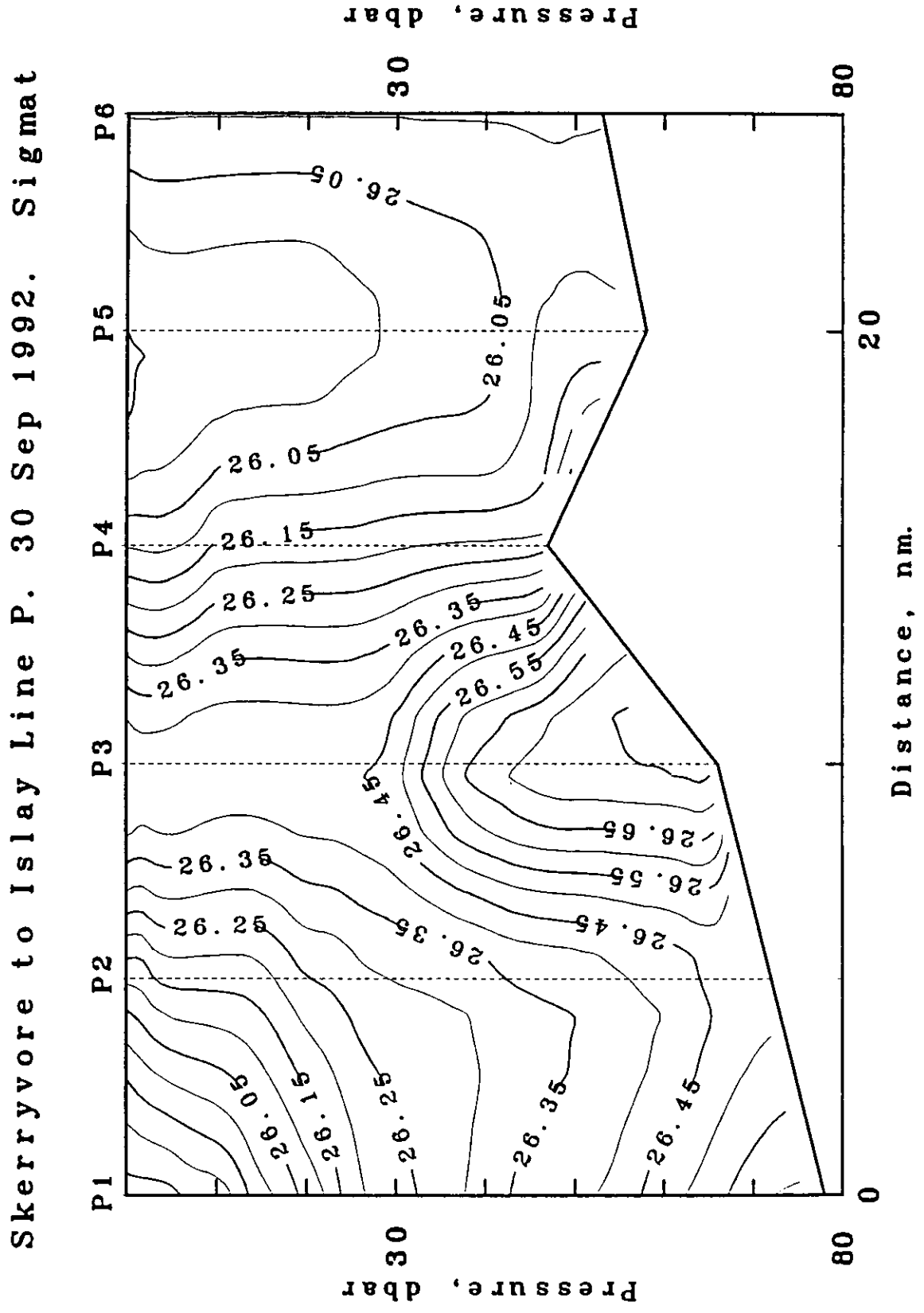
Figure 7


Skerryvore to Islay Line P. 30 Sep 1992. Temperature
Pressure, dbar
30
80
P6
P5
P4
P3
P2
P1
20
0
Distance, nm.
13.4
13.2
13
12.8
12.6
12.4
12.2
12.8
12.6
12.4
12.2
12.8
13
13
13.2
13.2
13
12.8

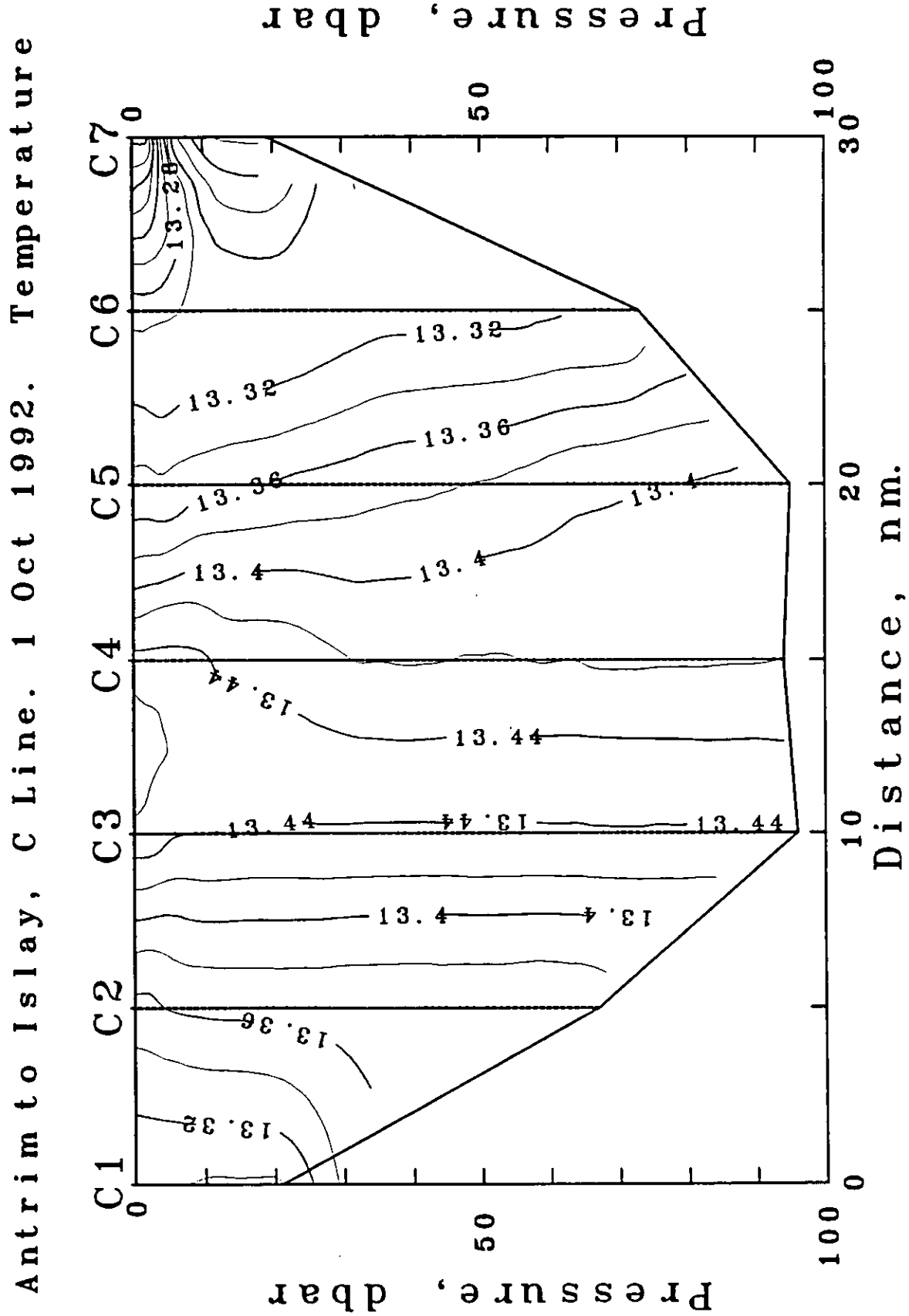


Section from uncalibrated Seabird CTD

Figure 9

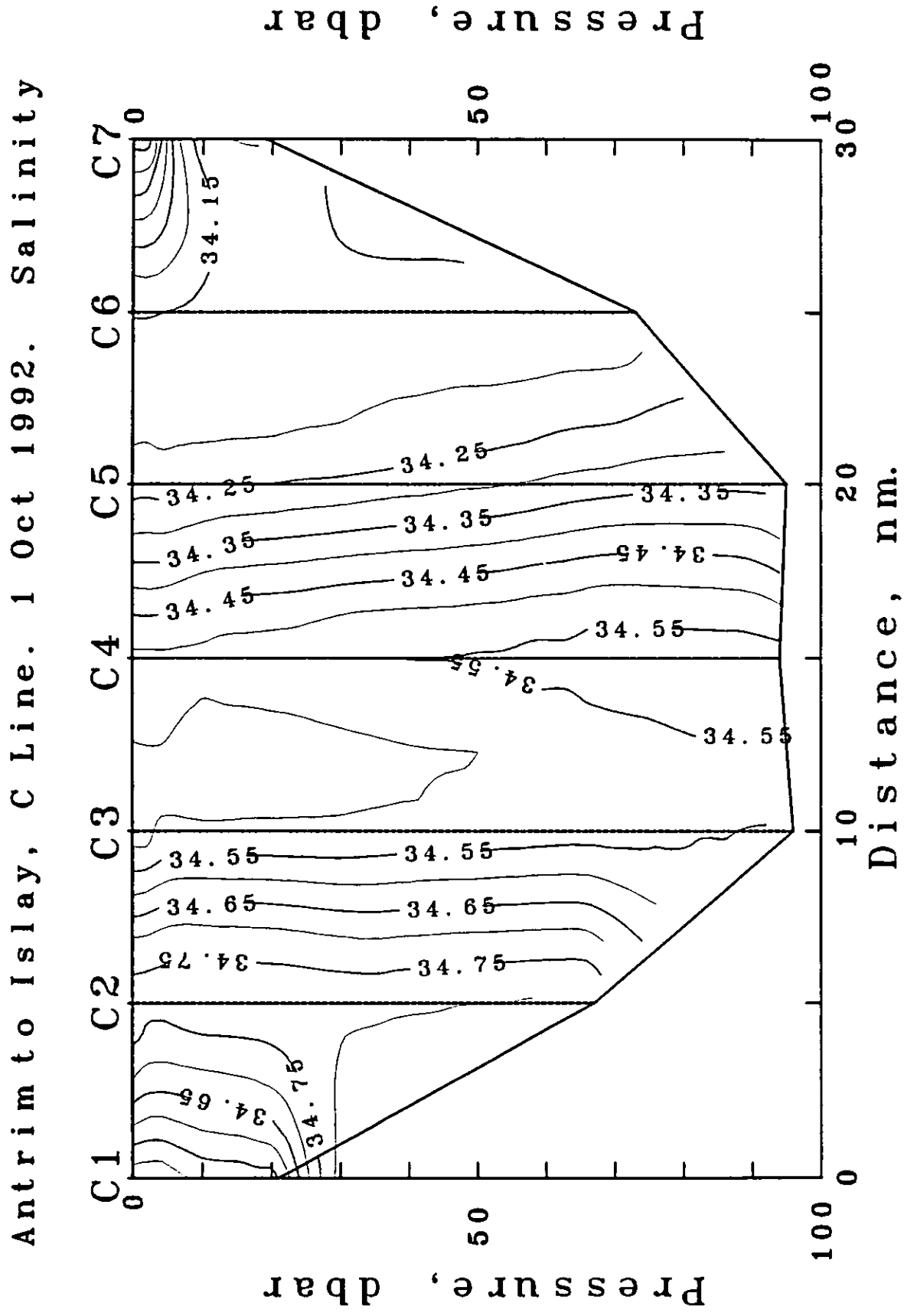


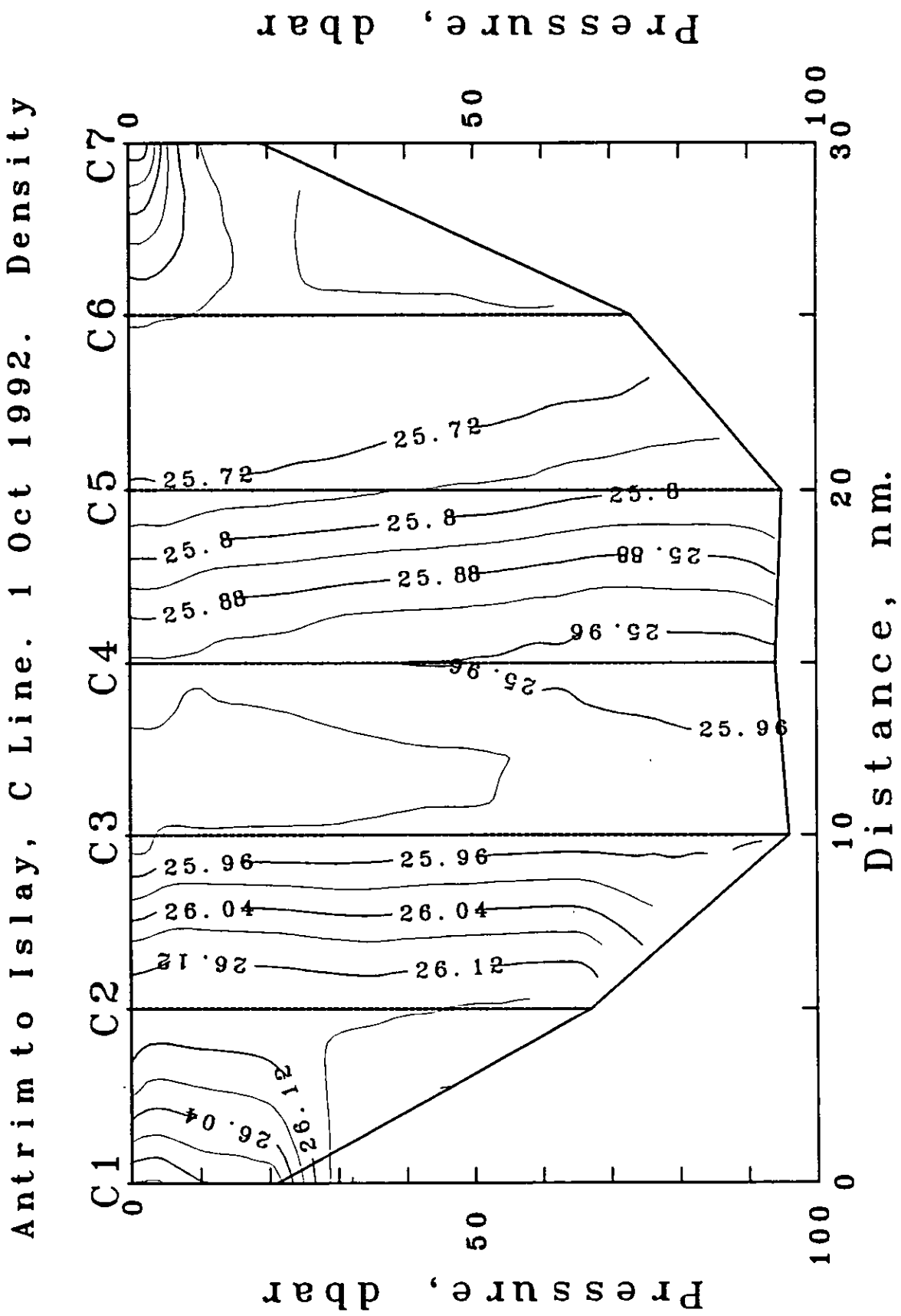
Section from uncalibrated Seabird CTD Figure 10



Section from uncalibrated Seabird CTD

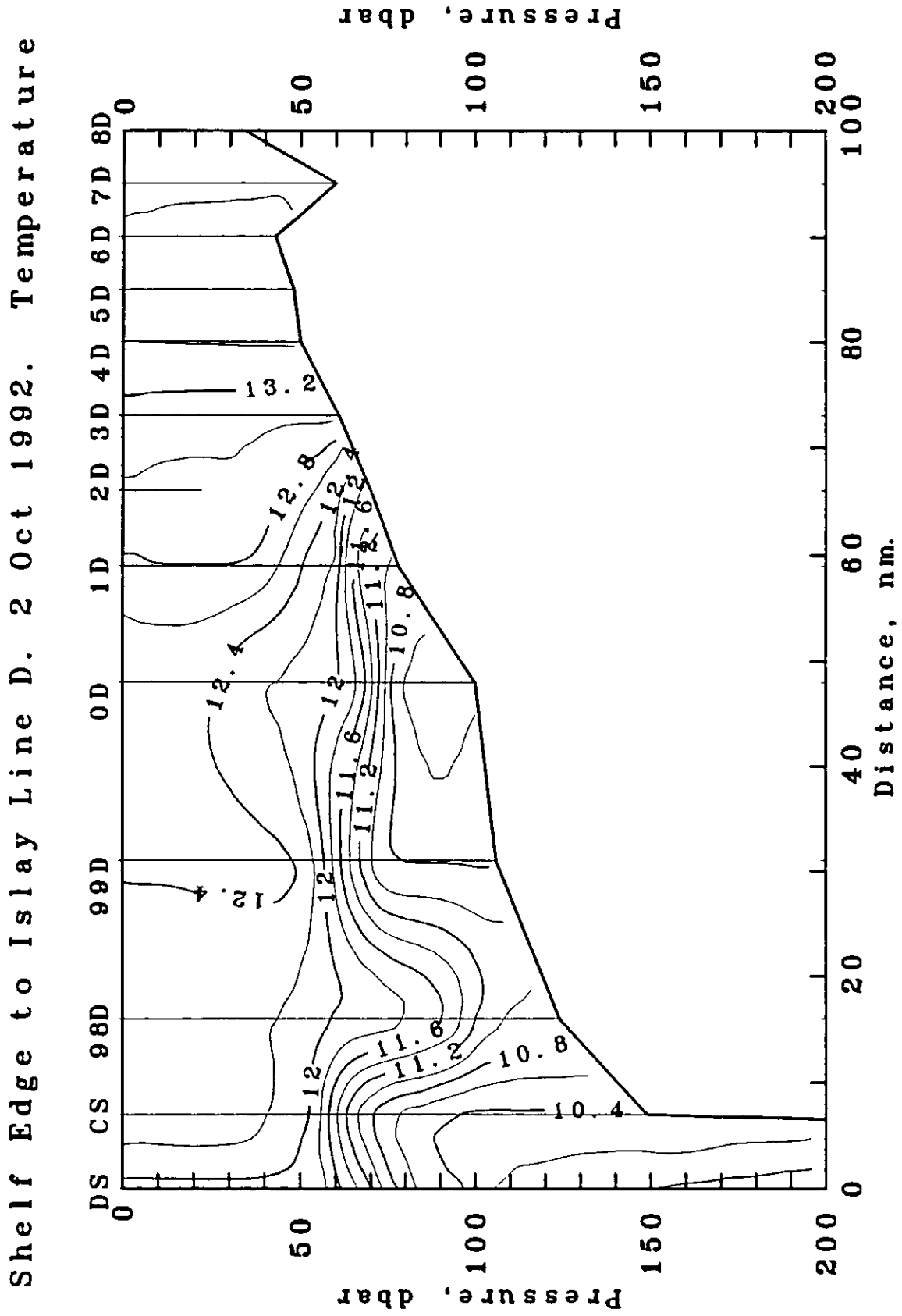
Figure 11

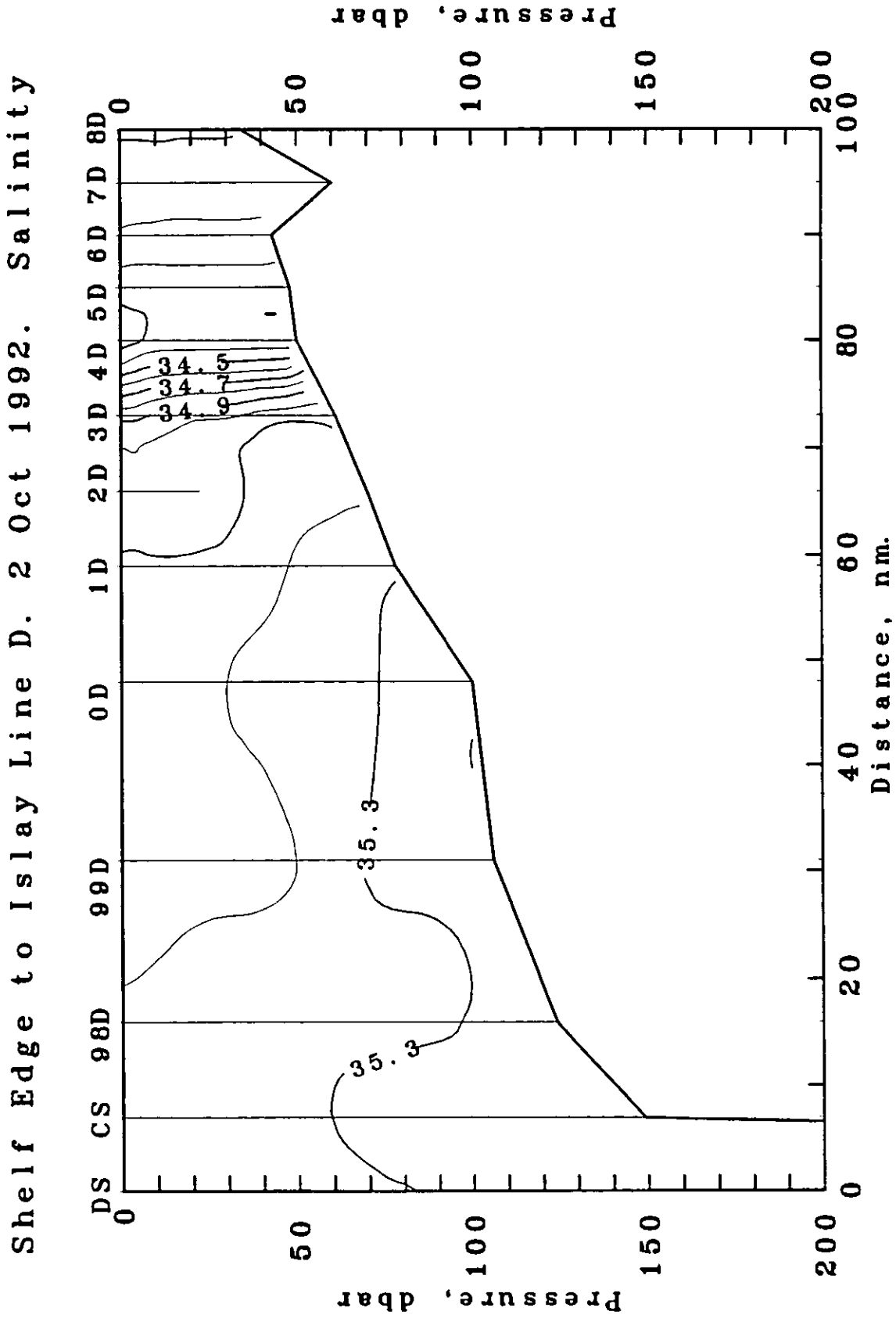

Pressure, dbar
Antrim to Islay, C Line. 1 Oct 1992. Salinity
Distance, nm.
C7
C6
C5
C4
C3
C2
C1
0
50
100
30
20
10
0
34.15
34.25
34.35
34.45
34.55
34.65
34.75



Section from uncalibrated Seabird CTD

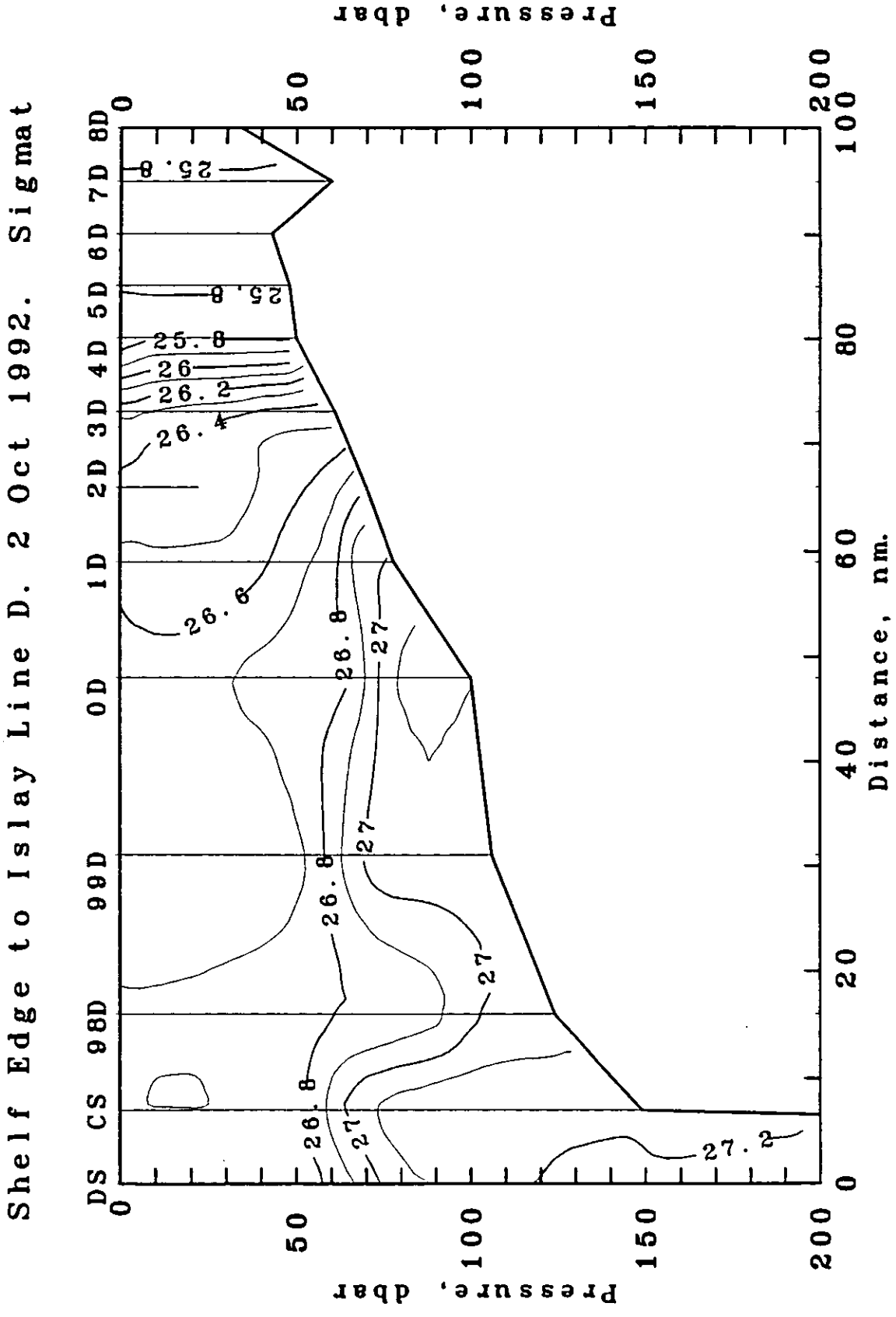
Figure 13


Shelf Edge to Islay Line D. 2 Oct 1992. Temperature
Pressure, dbar
0
50
100
150
200
DS
CS
98D
99D
0D
1D
2D
3D
4D
5D
6D
7D
8D
Distance, nm.
0
20
40
60
80
100
13.2
12.8
12.4
12
11.6
11.2
10.8
10.4



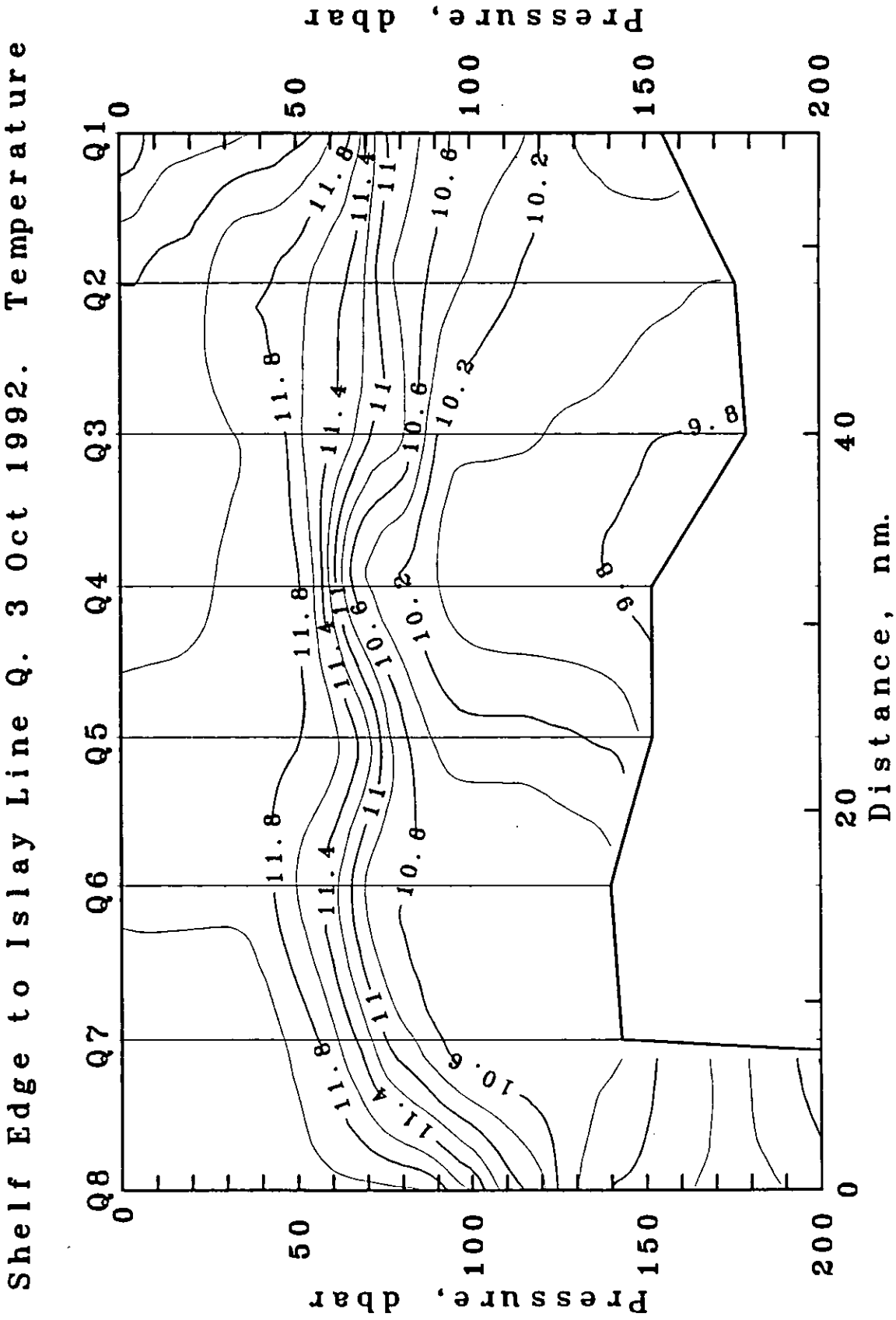
Section from uncalibrated Seabird CTD

Figure 15

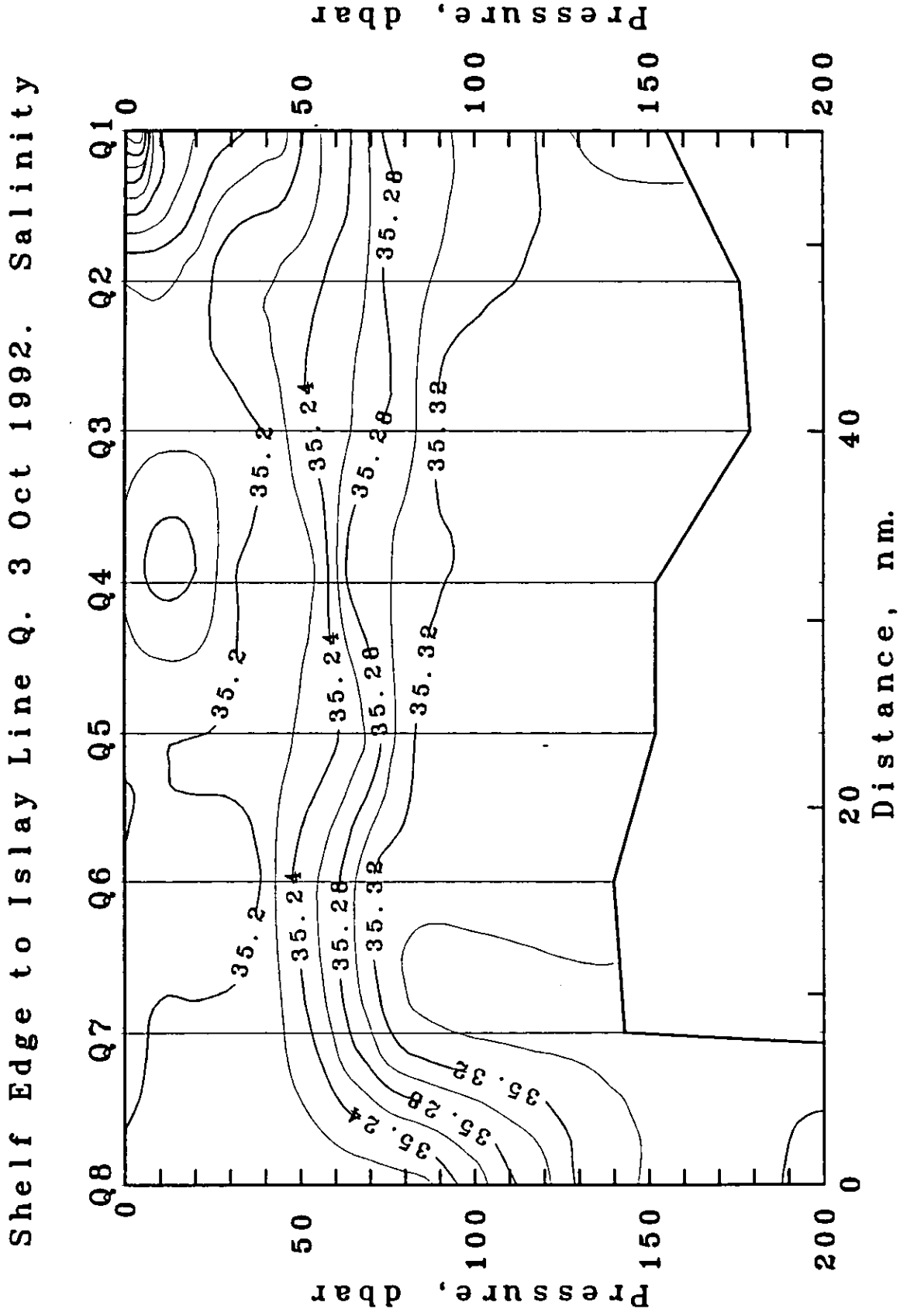


Section from uncalibrated Seabird CTD

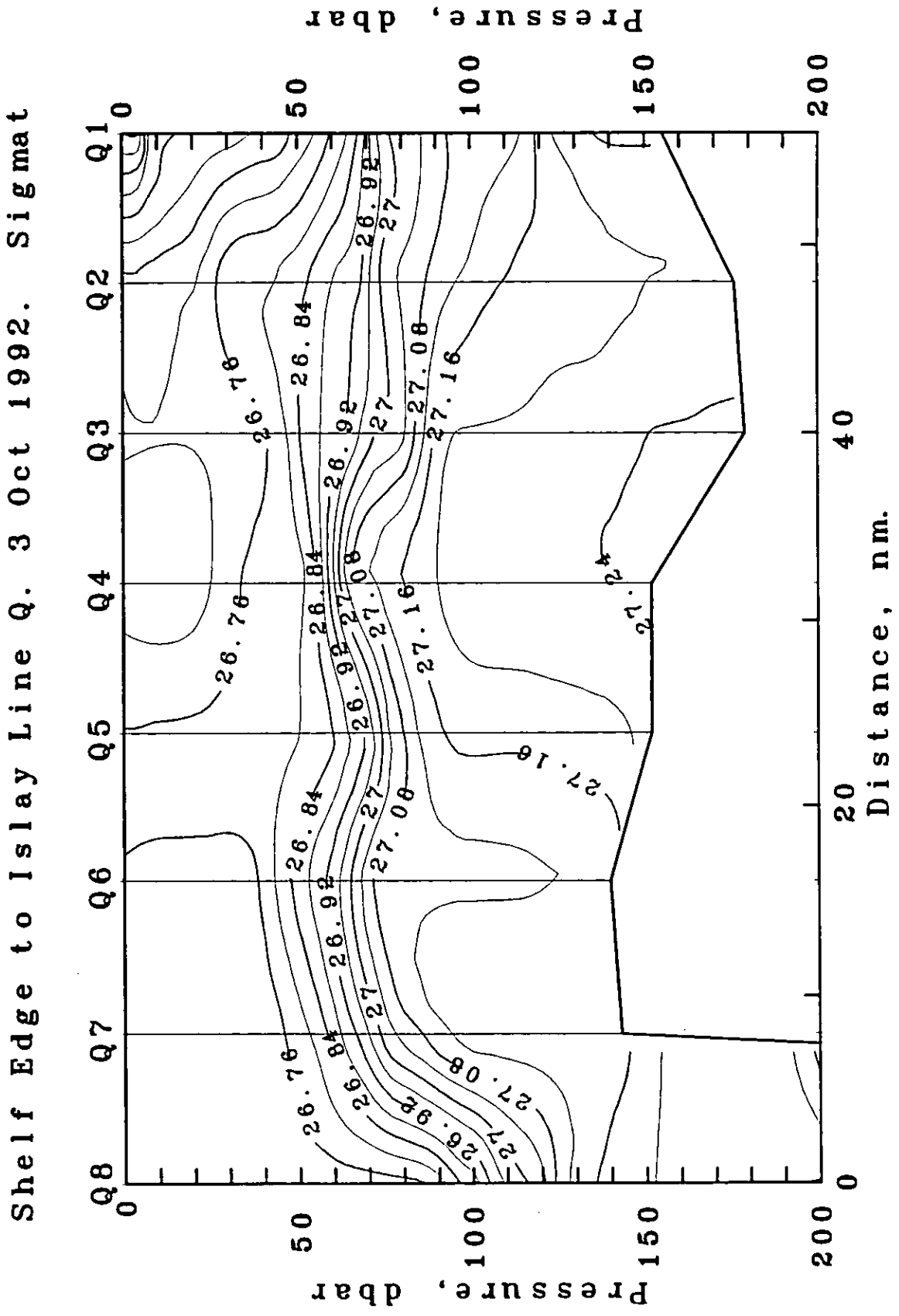
Figure 16



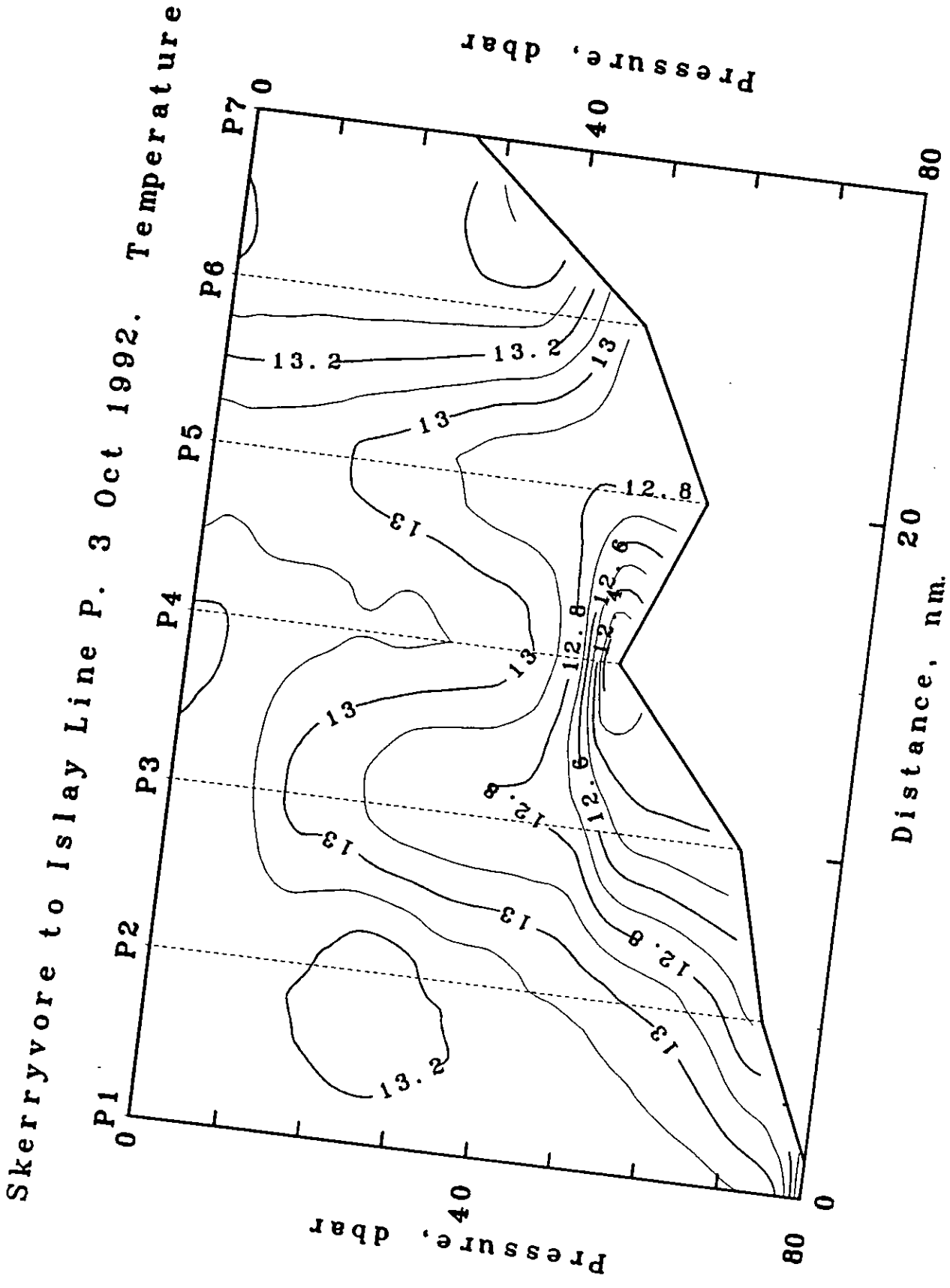
Section from uncalibrated Seabird CTD Figure 17



Section from uncalibrated Seabird CTD Figure 18

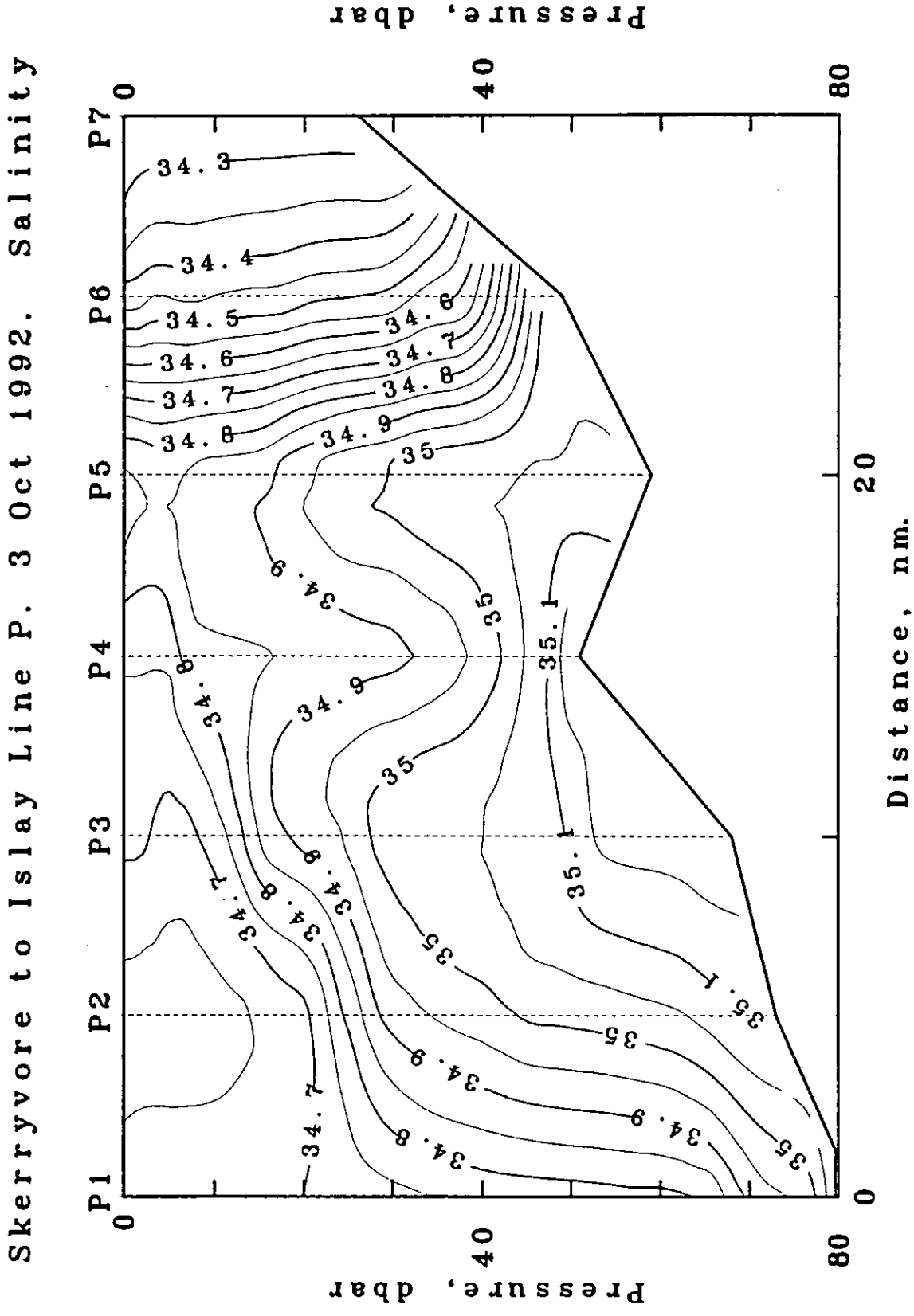


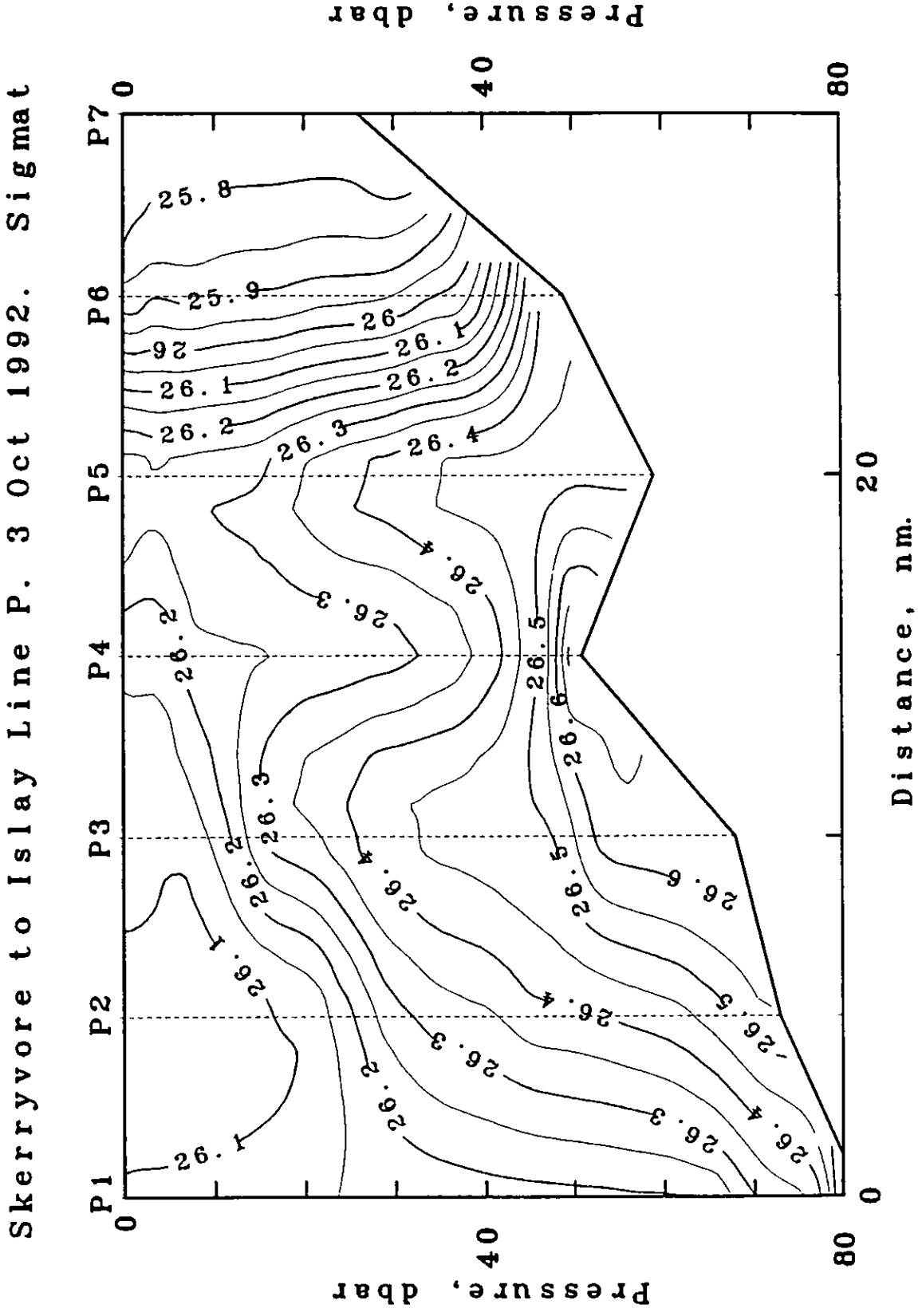
Section from uncalibrated Seabird CTD Figure 19



from uncalibrated Seabird CTD

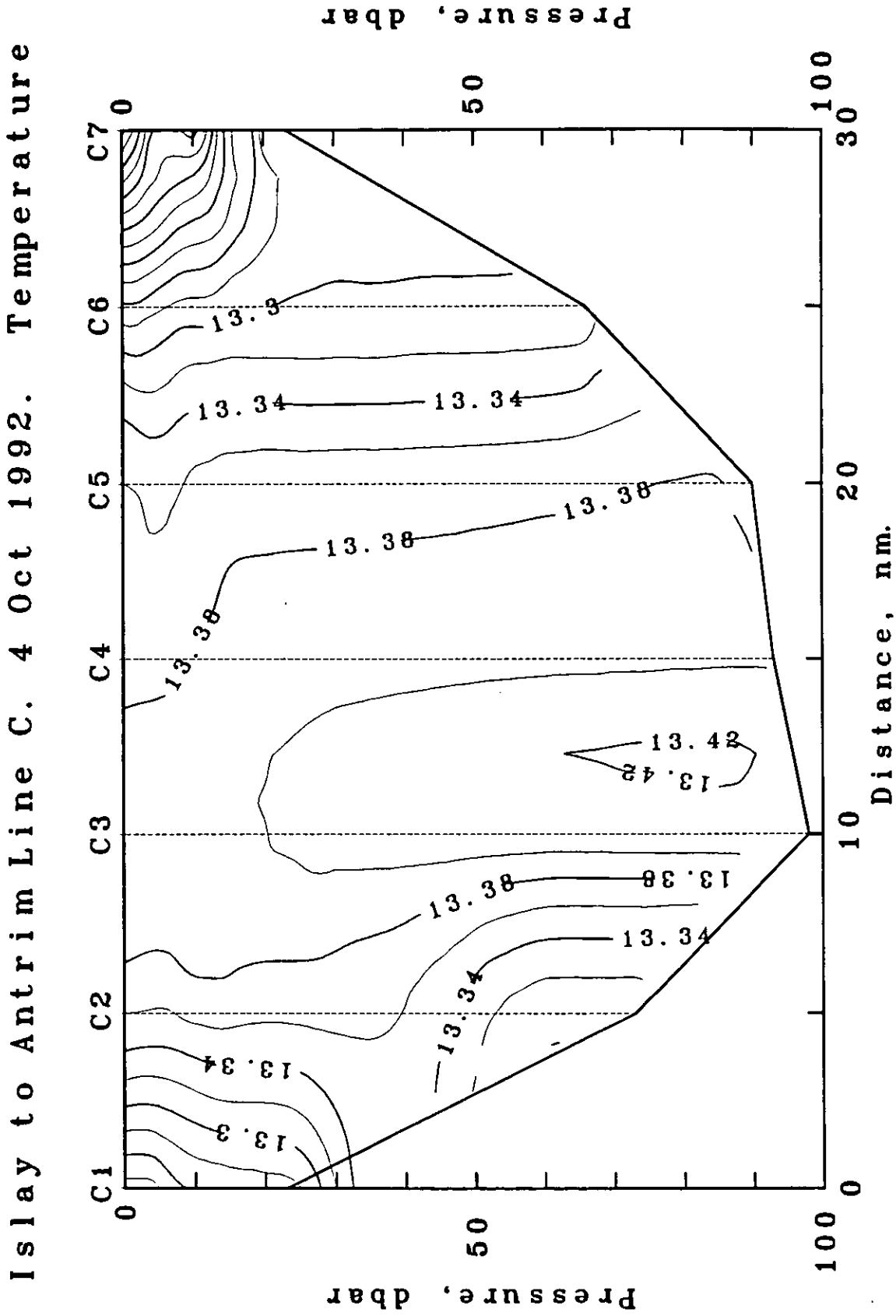
Figure 20


Skerryvore to Islay Line P. 3 Oct 1992. Salinity
Pressure, dbar
0
40
80
P7
P6
P5
P4
P3
P2
P1
34.3
34.4
34.5
34.6
34.7
34.8
34.9
35
35.1
Distance, nm.
0
20

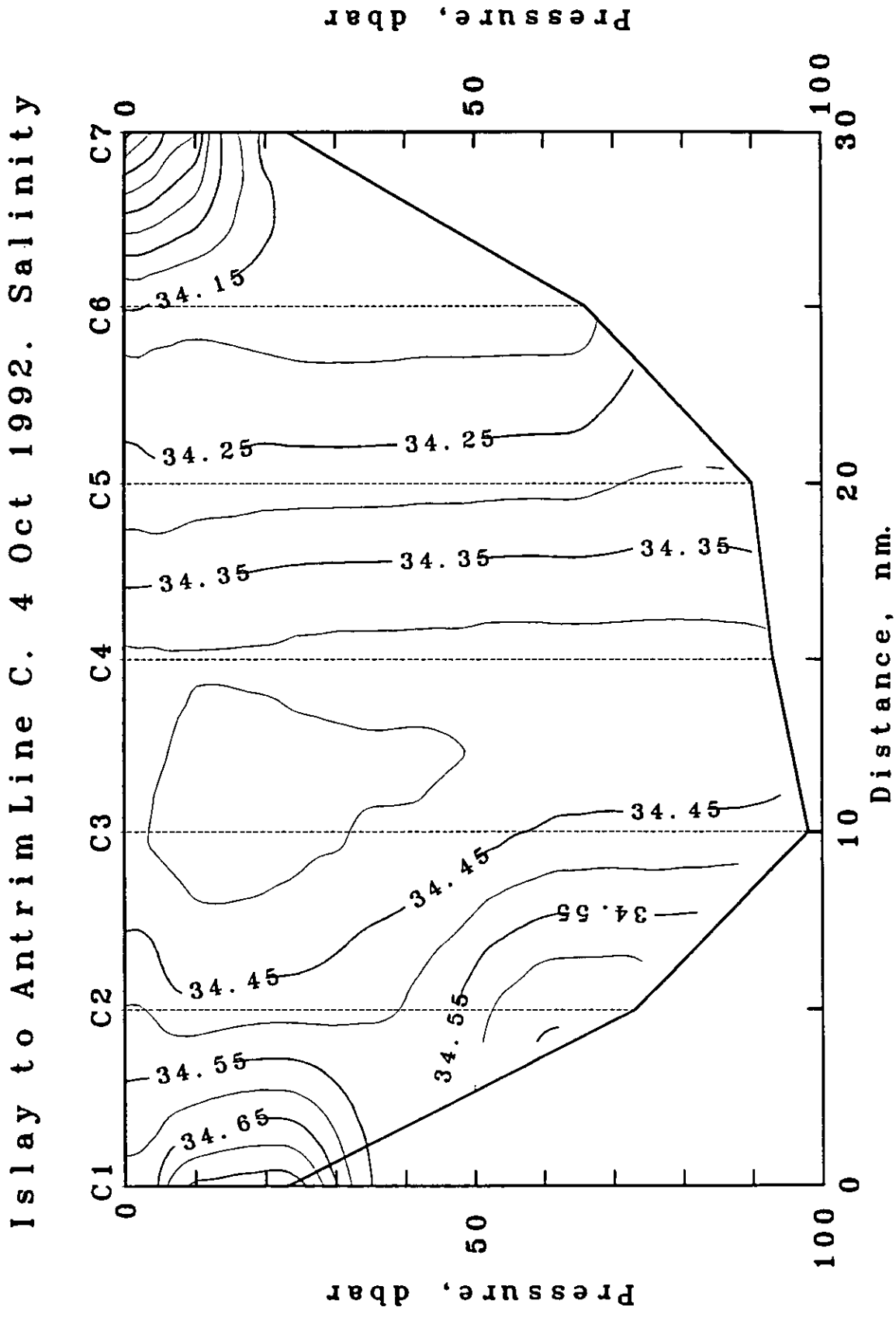


Section from uncalibrated Seabird CTD

Figure 22

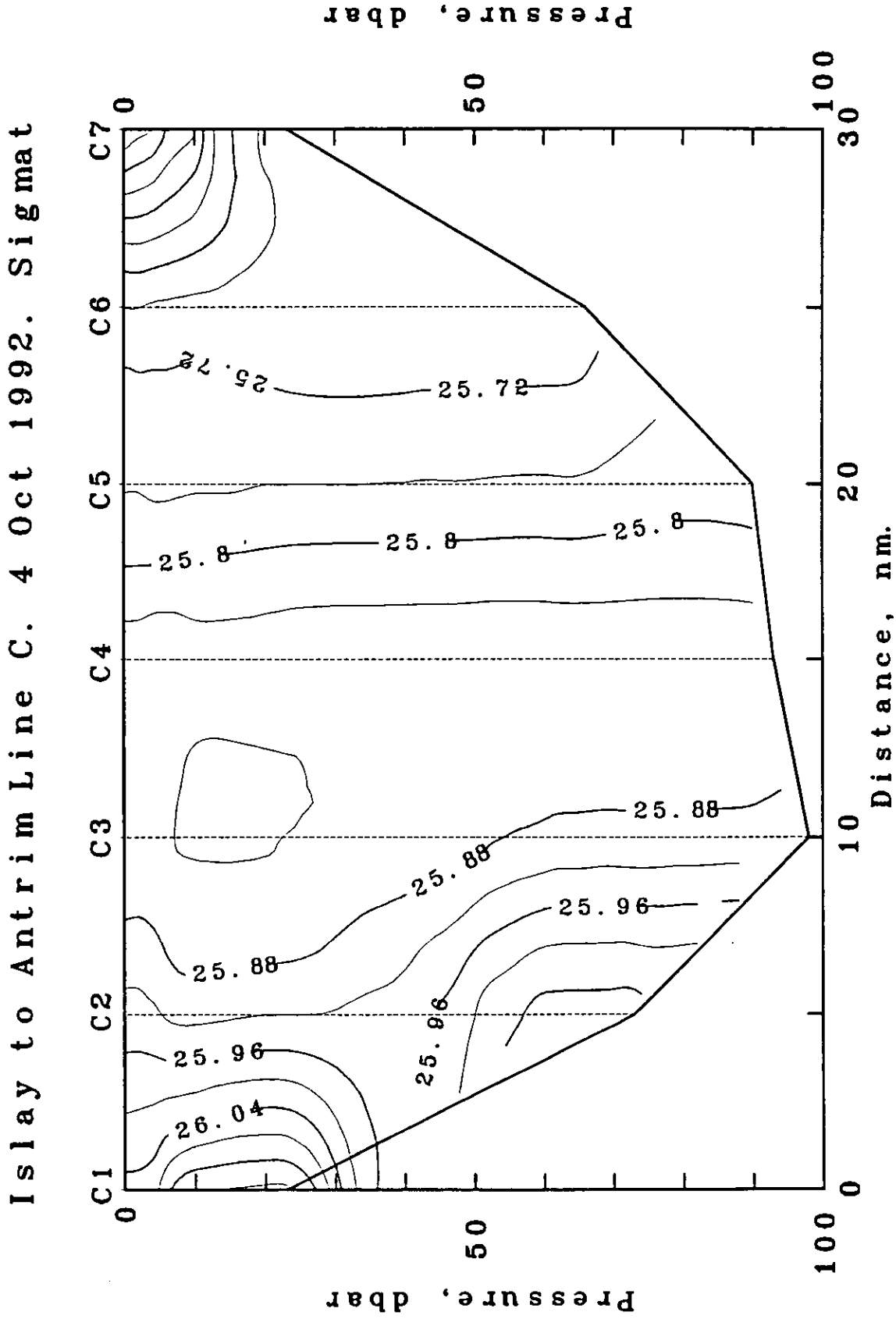


Section from uncalibrated Seabird CTD Figure 23



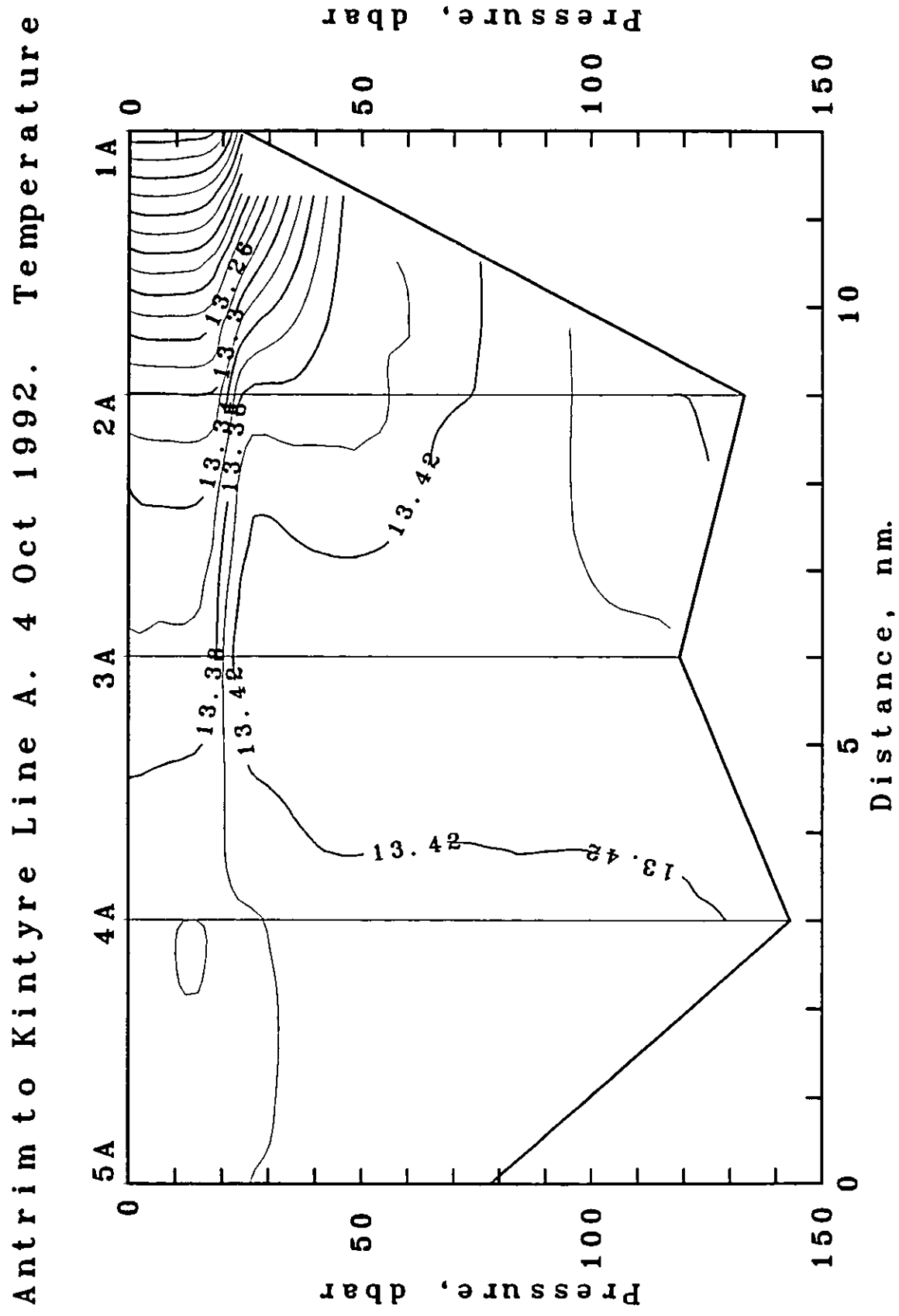
Section from uncalibrated Seabird CTD

Figure 24



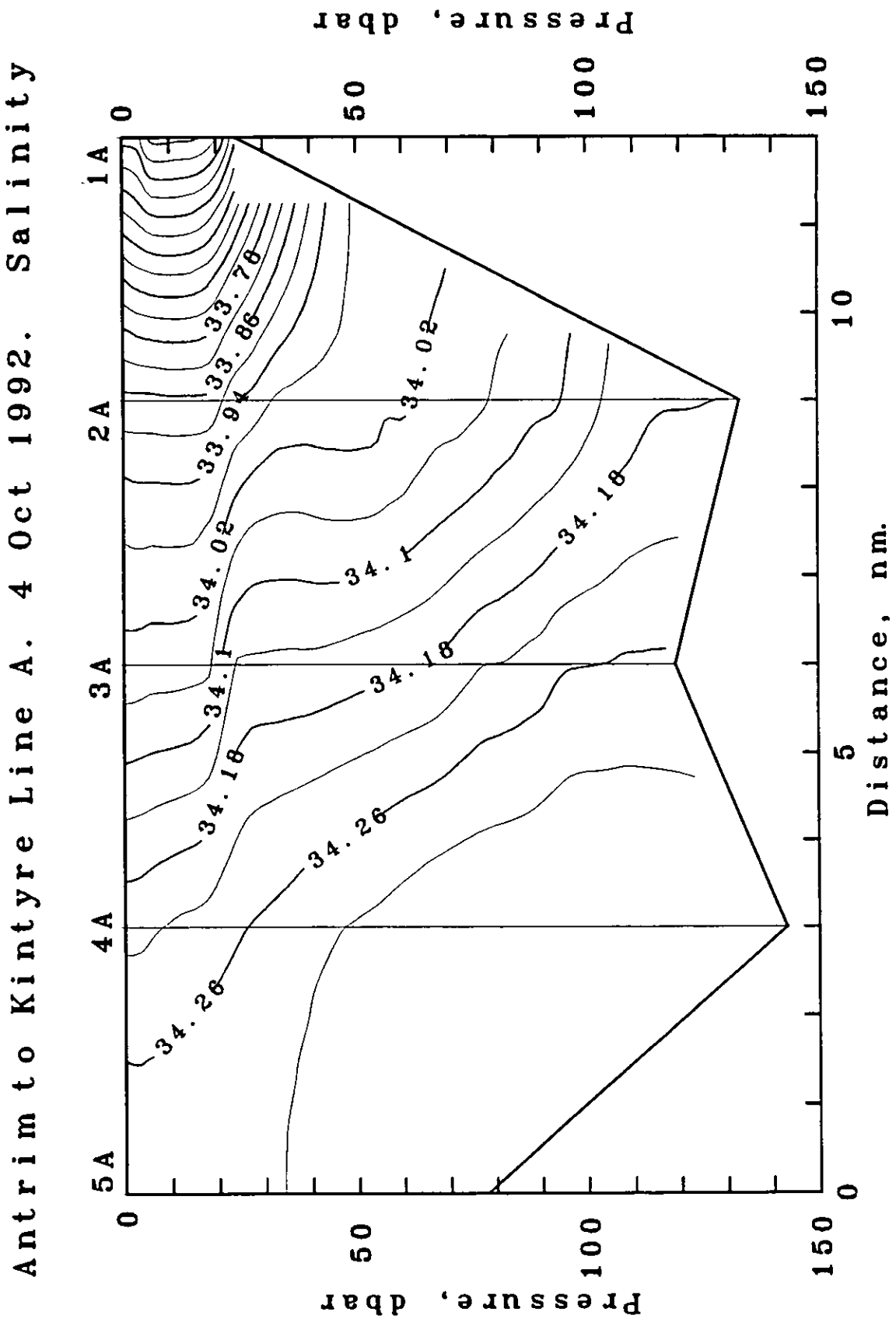
Section from uncalibrated Seabird CTD

Figure 25



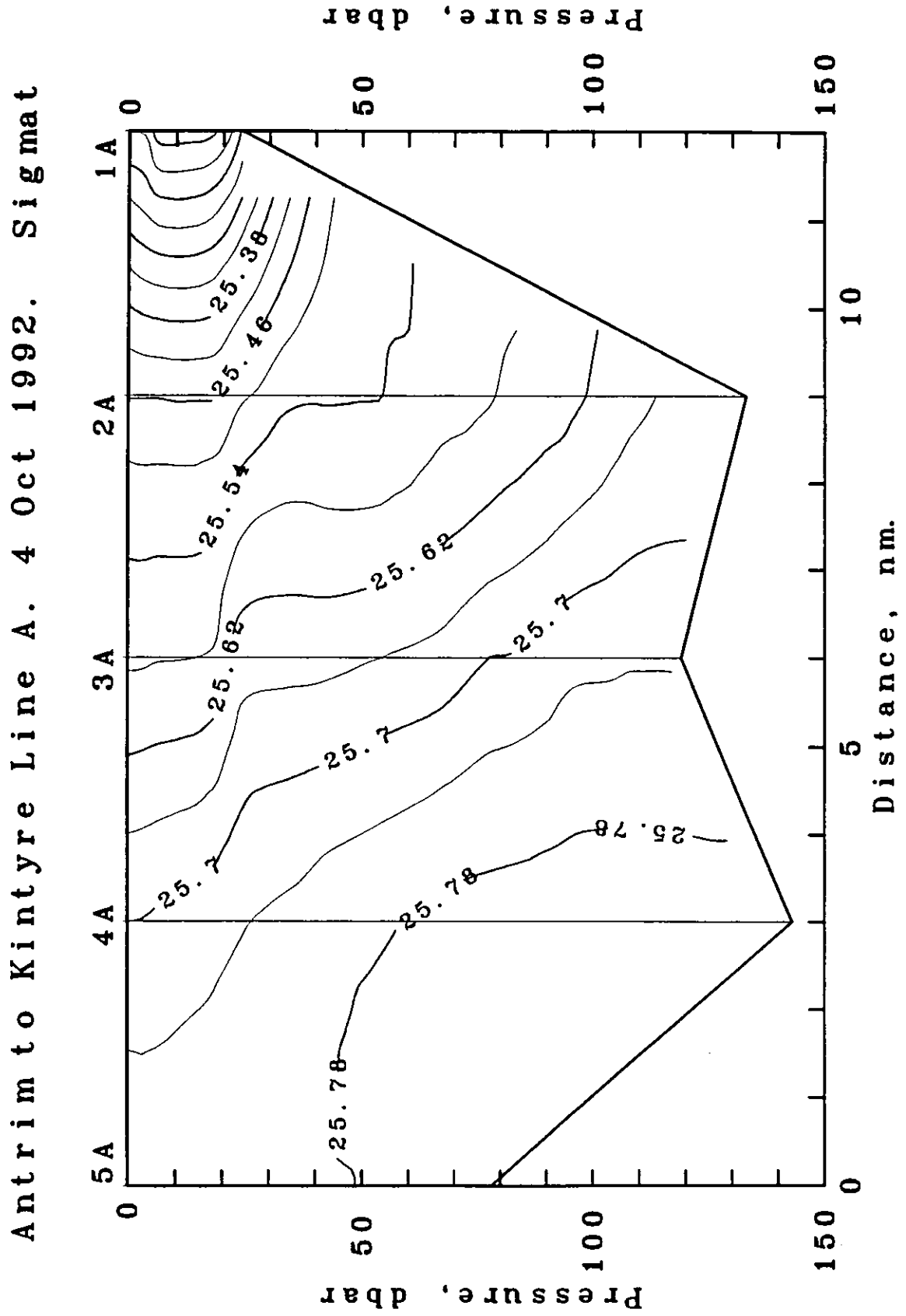
Section from uncalibrated Seabird CTD

Figure 26



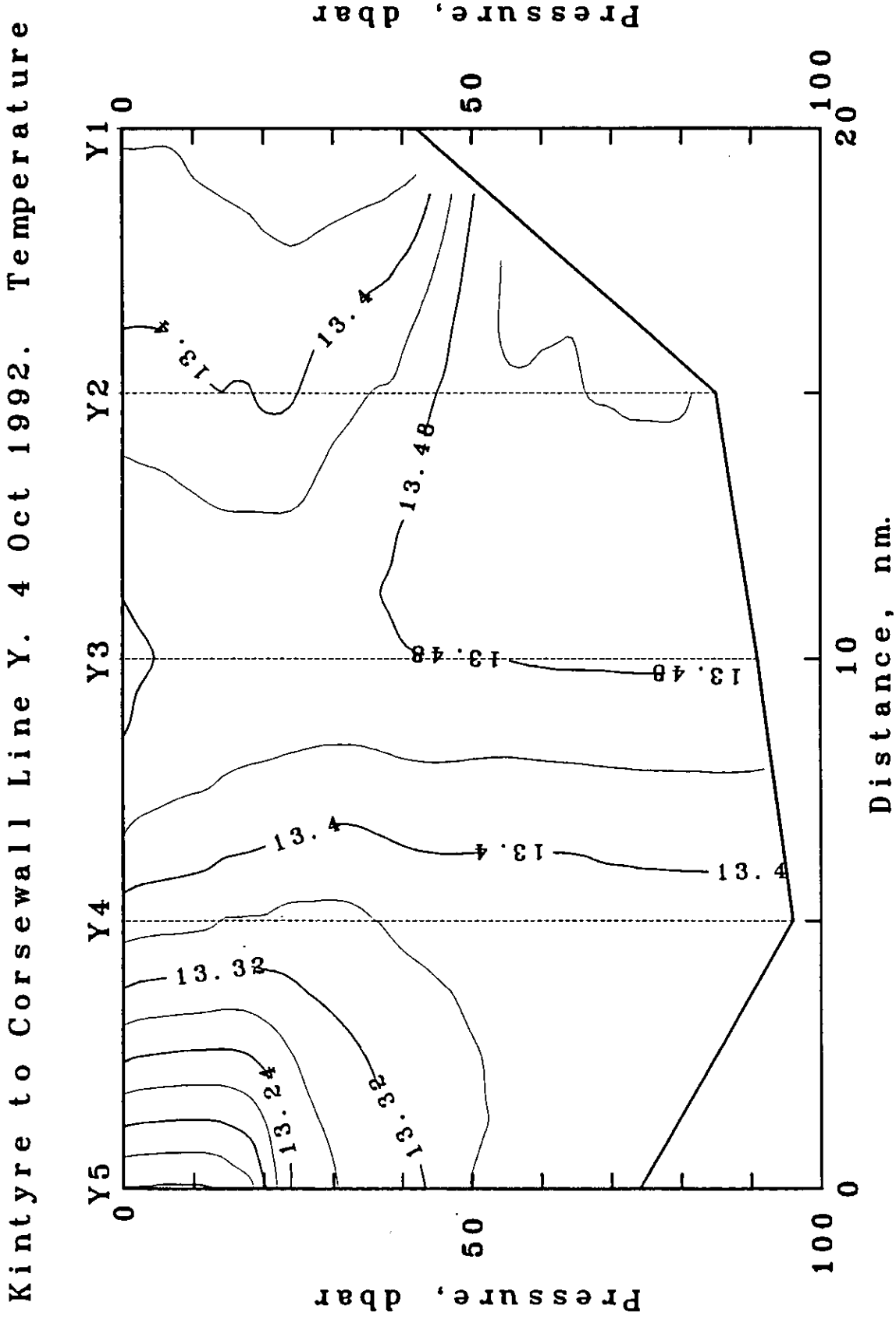
Section from uncalibrated Seabird CTD

Figure 27



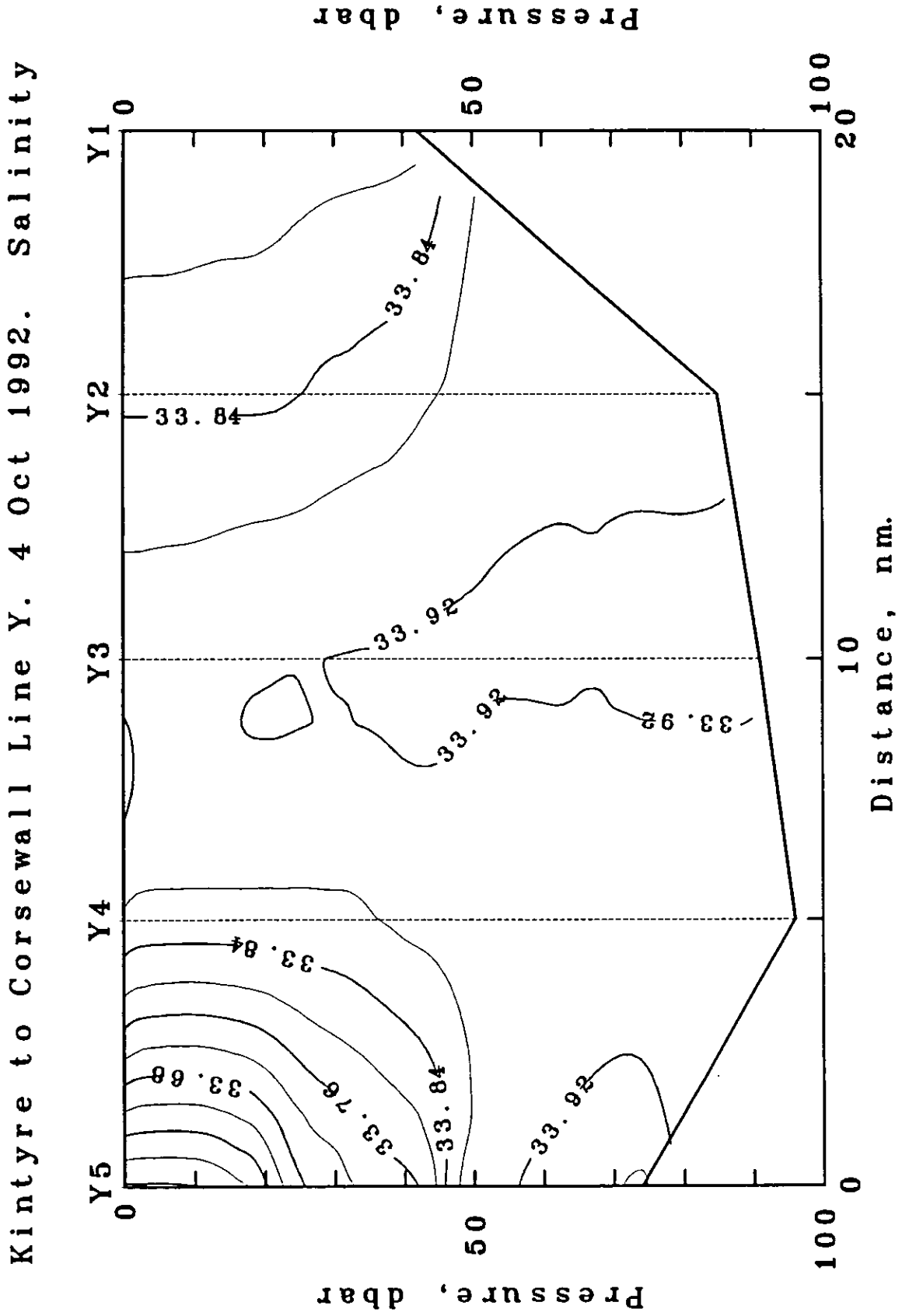
Section from uncalibrated Seabird CTD

Figure 28



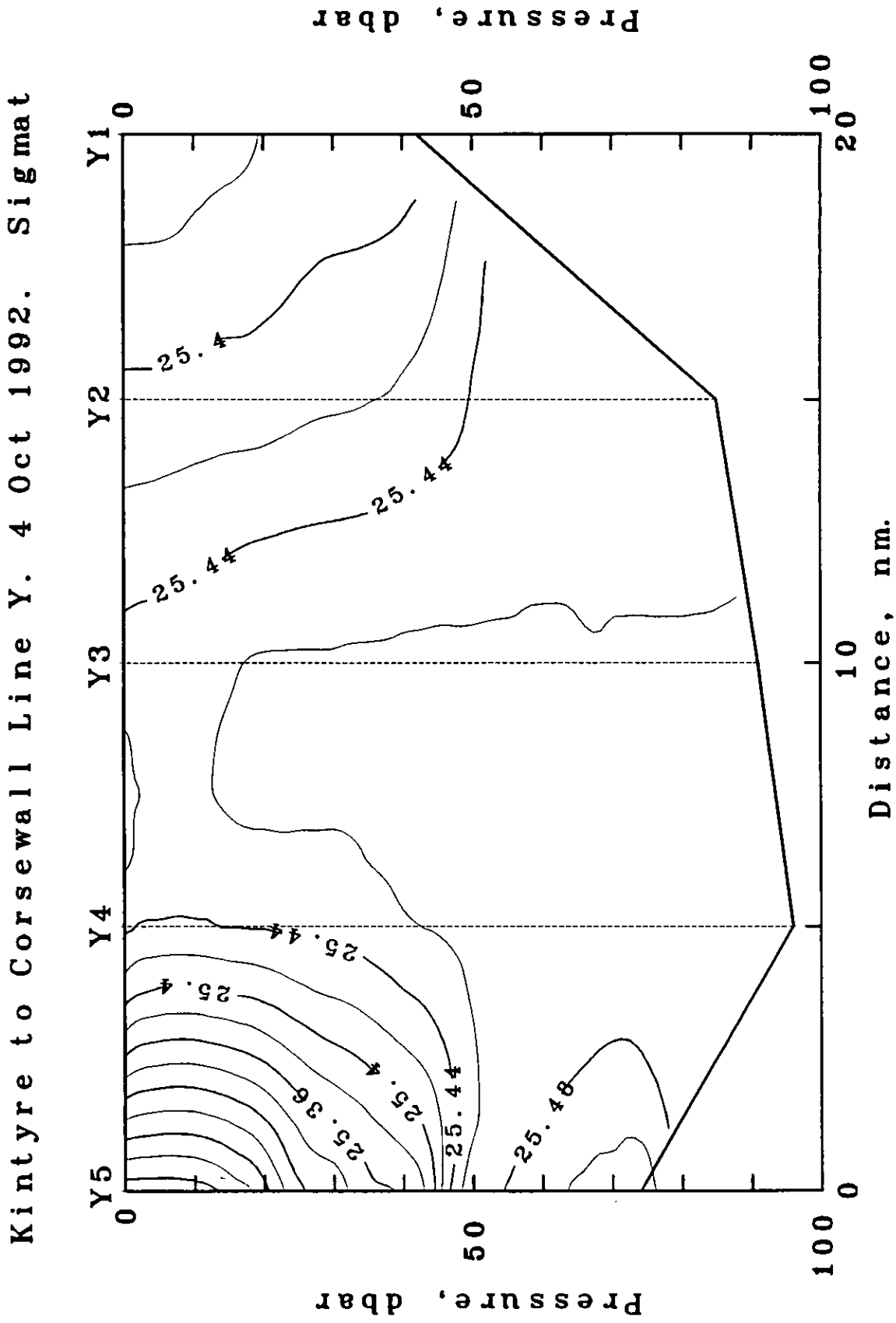
Section from uncalibrated Seabird CTD

Figure 29

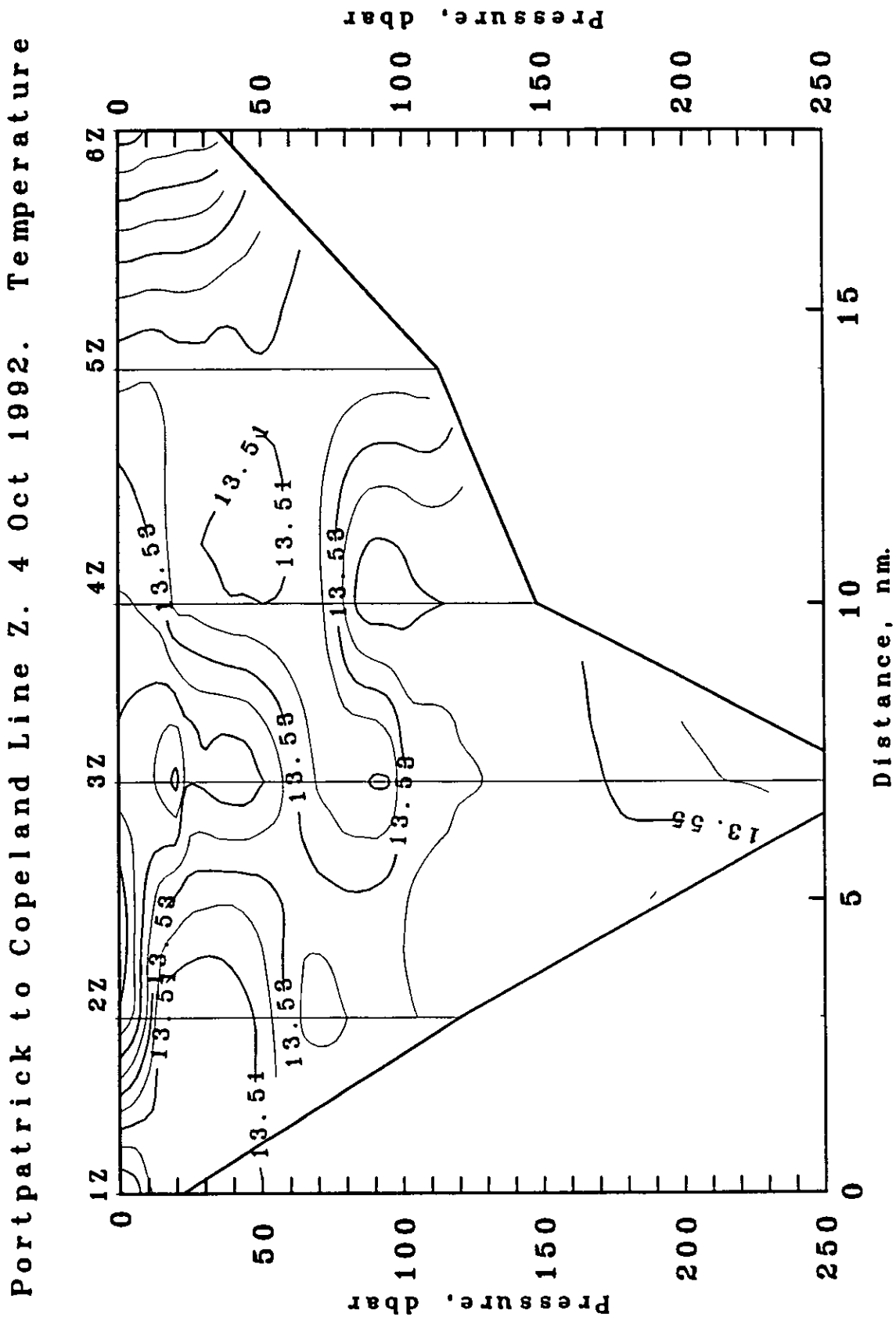


Section from uncalibrated Seabird CTD

Figure 30

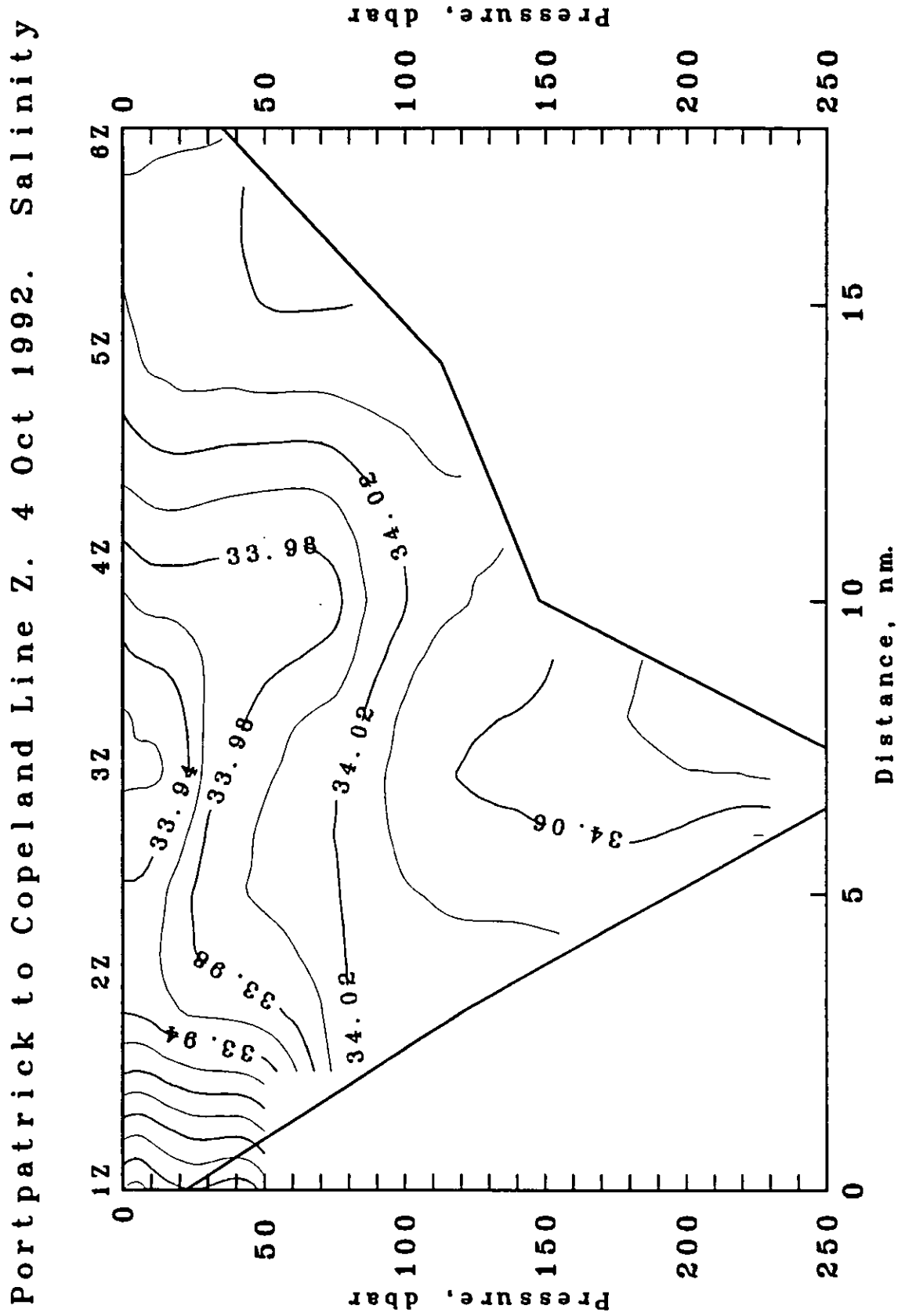


Section from uncalibrated Seabird CTD Figure 31

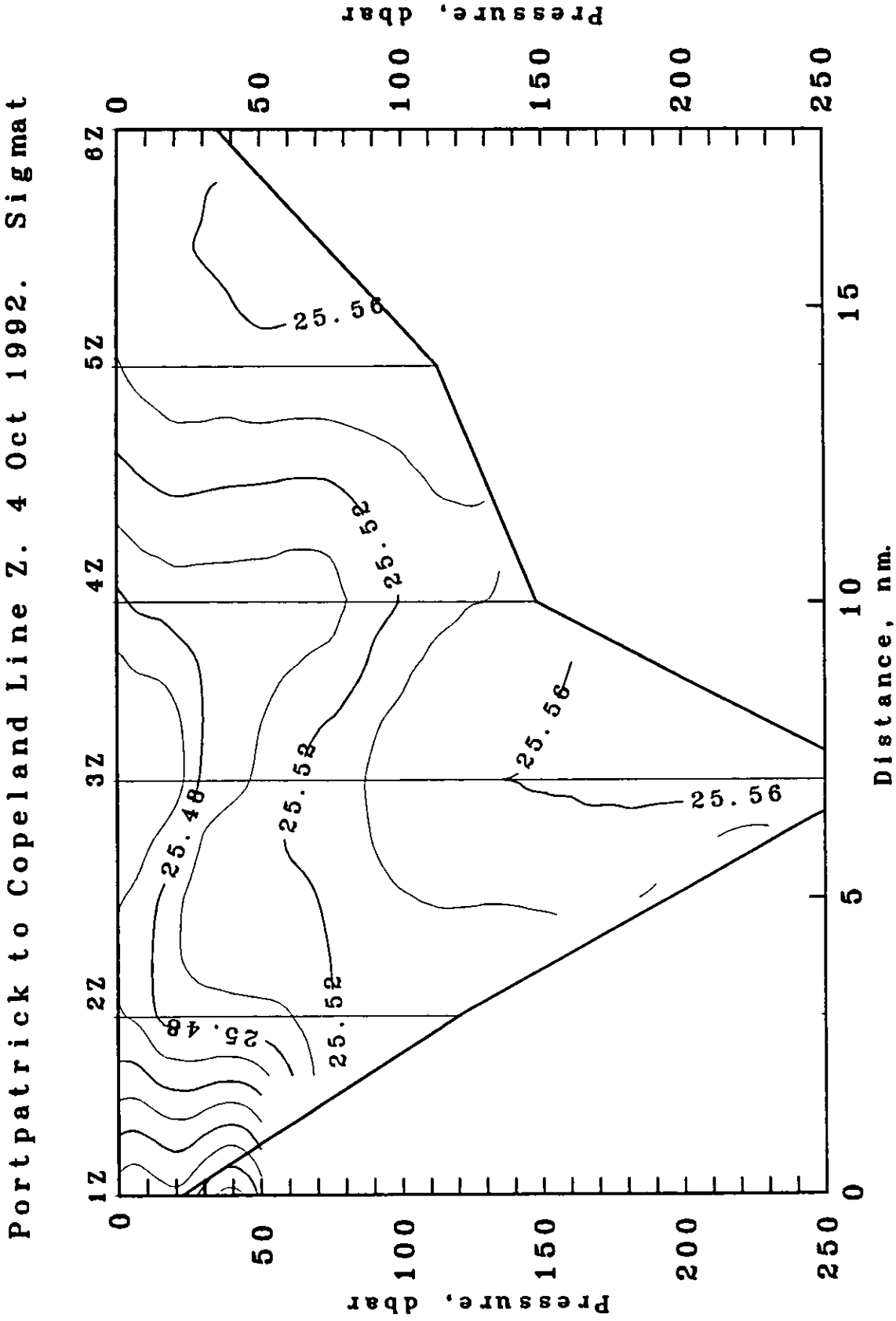


Section from uncalibrated Seabird CTD

Figure 32

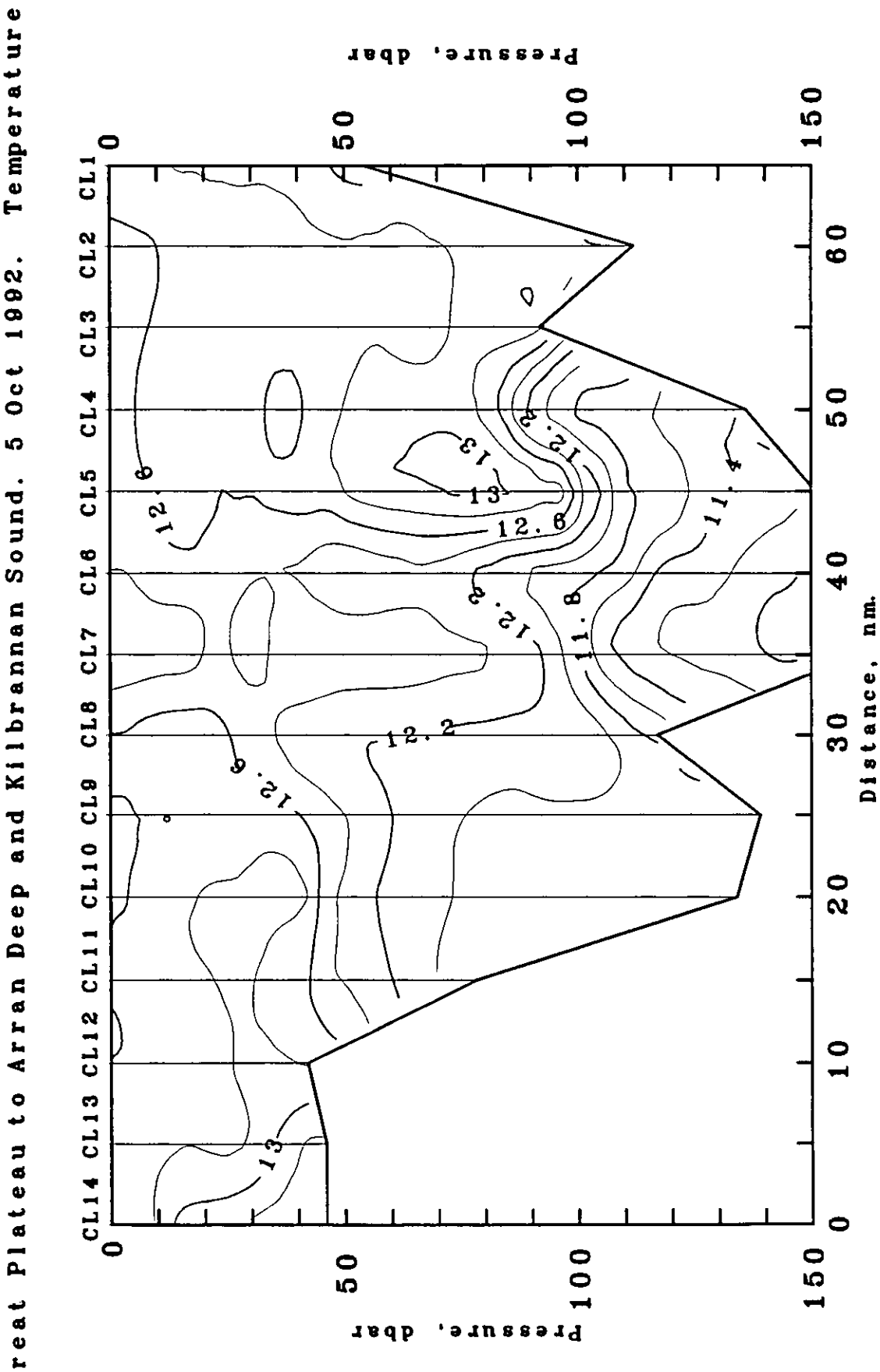


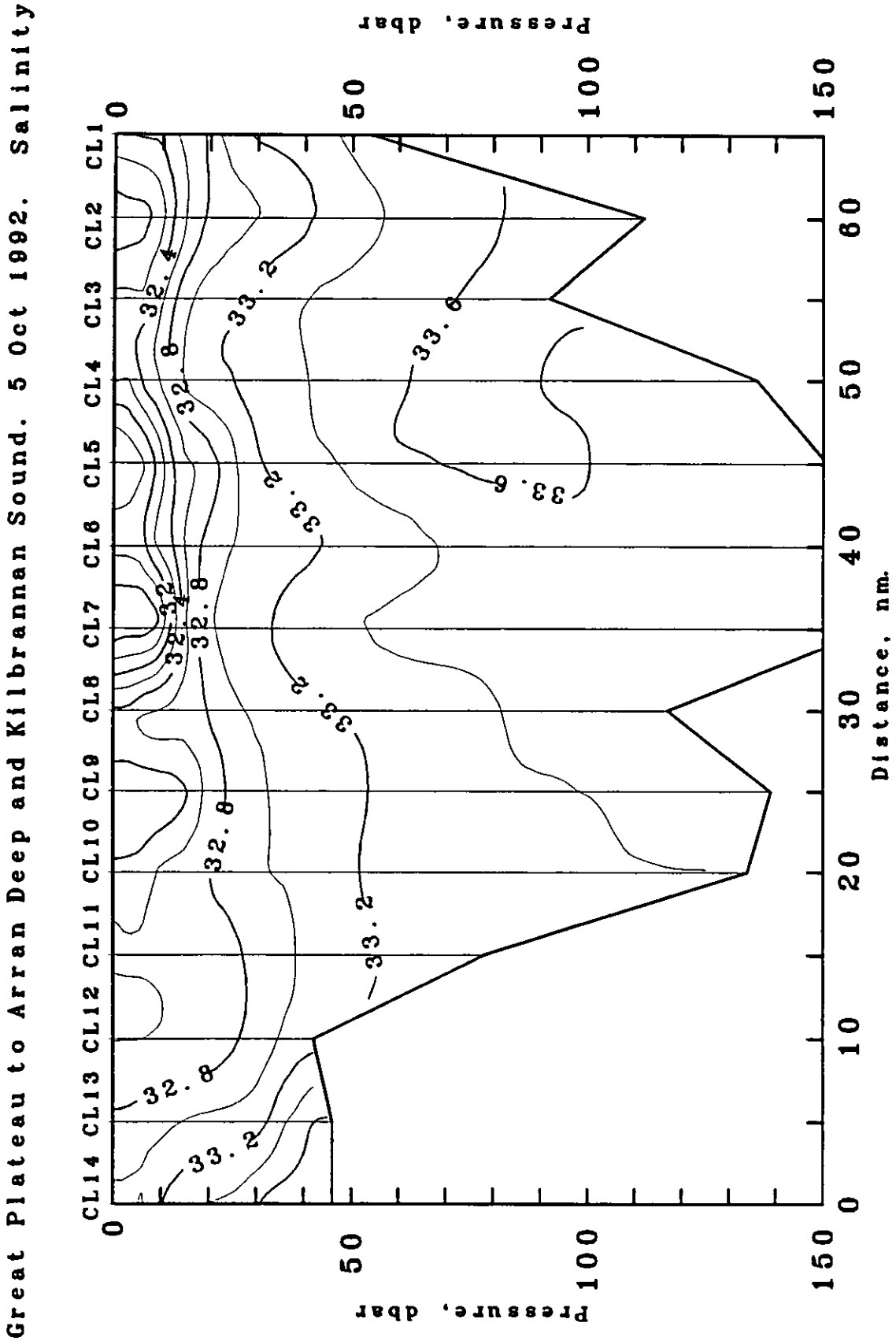
Section from uncalibrated Seabird CTD Figure 33

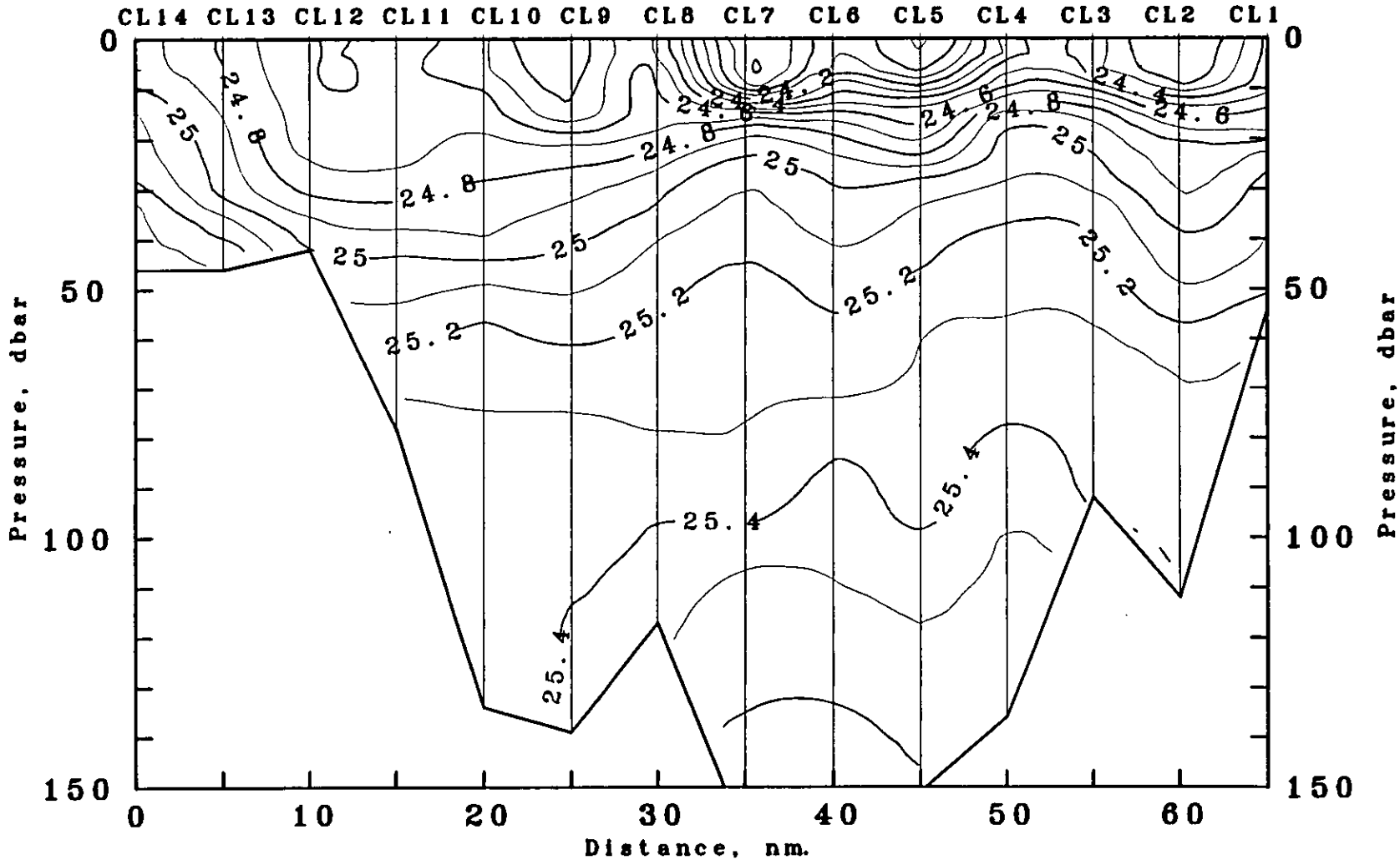


Section from uncalibrated Seabird CTD

Figure 34

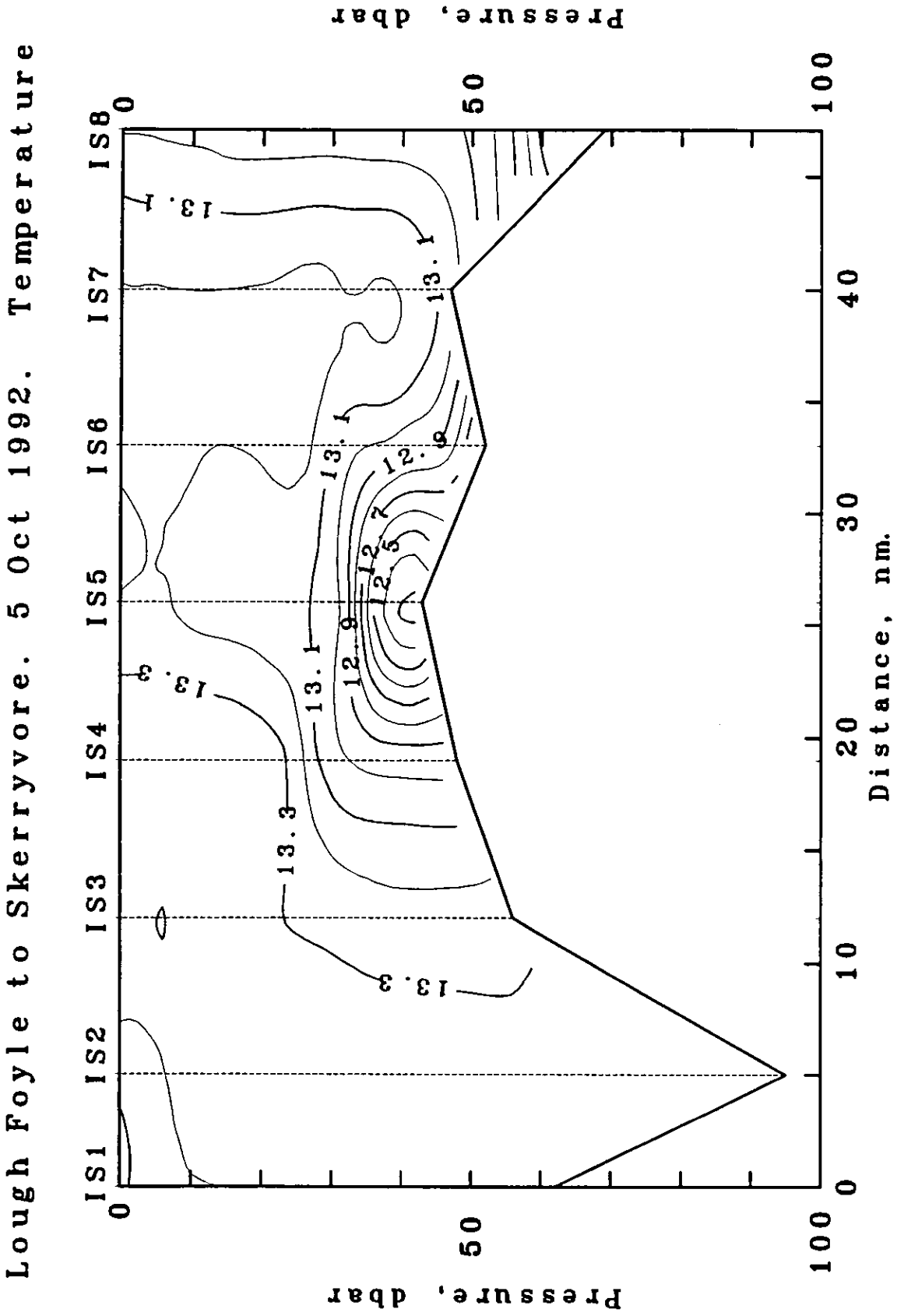

Great Plateau to Arran Deep and Kilbrannan Sound. 5 Oct 1992. Temperature
CL14 CL13 CL12 CL11 CL10 CL9 CL8 CL7 CL6 CL5 CL4 CL3 CL2 CL1
Pressure, dbar
0
50
100
150
Distance, nm.
0
10
20
30
40
50
60
12.6
13
12.2
11.8
11.4
12.2
12.2
13


Great Plateau to Arran Deep and Kilbrannan Sound. 5 Oct 1992. Salinity
Pressure, dbar
0
50
100
150
CL1 CL2 CL3 CL4 CL5 CL6 CL7 CL8 CL9 CL10 CL11 CL12 CL13 CL14
Distance, nm.
0
10
20
30
40
50
60
32.4
32.8
33.2
33.6
33.6
33.2
32.8
32.4
32.8
33.2
32.8
33.2

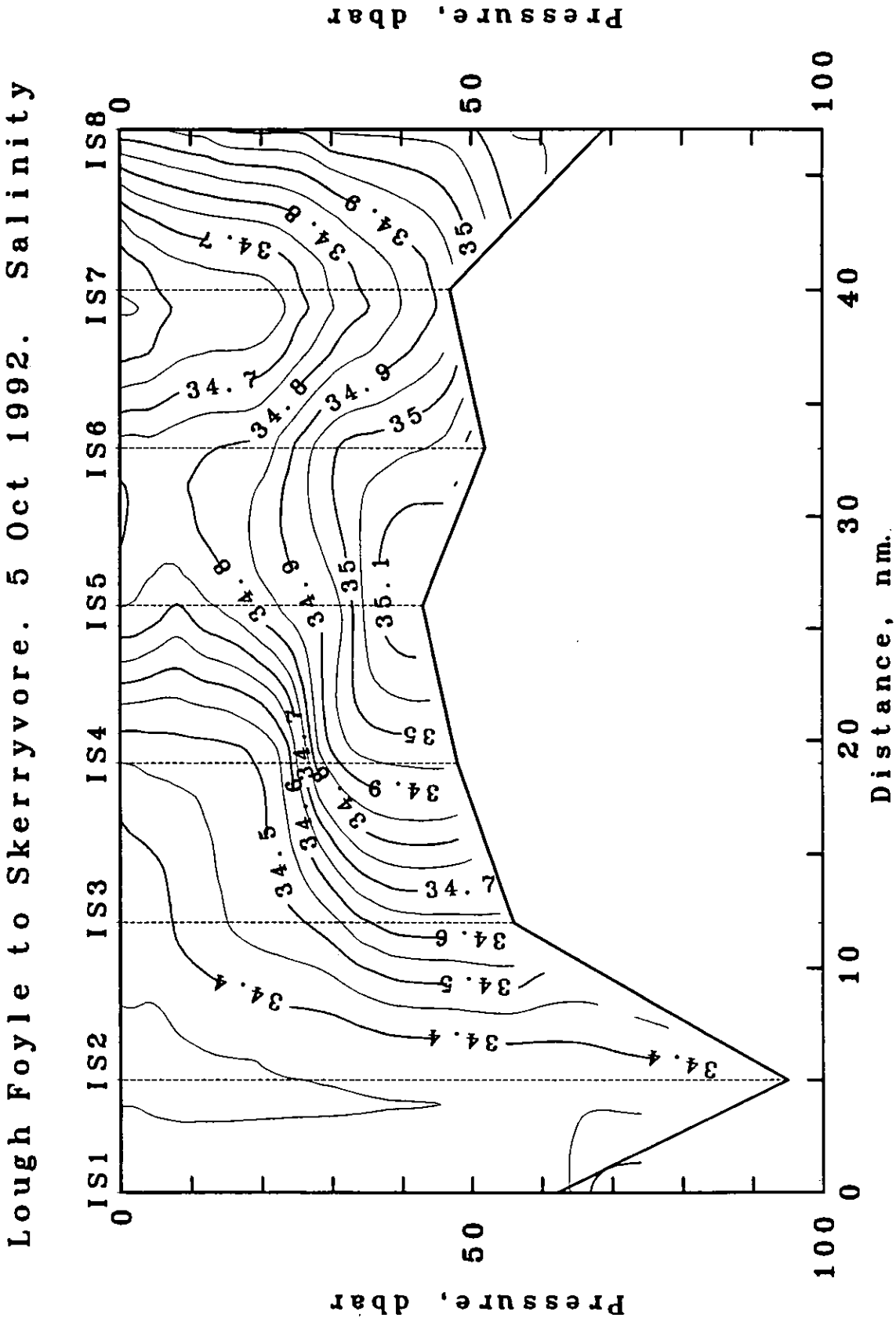


Section from uncalibrated Seabird CTD

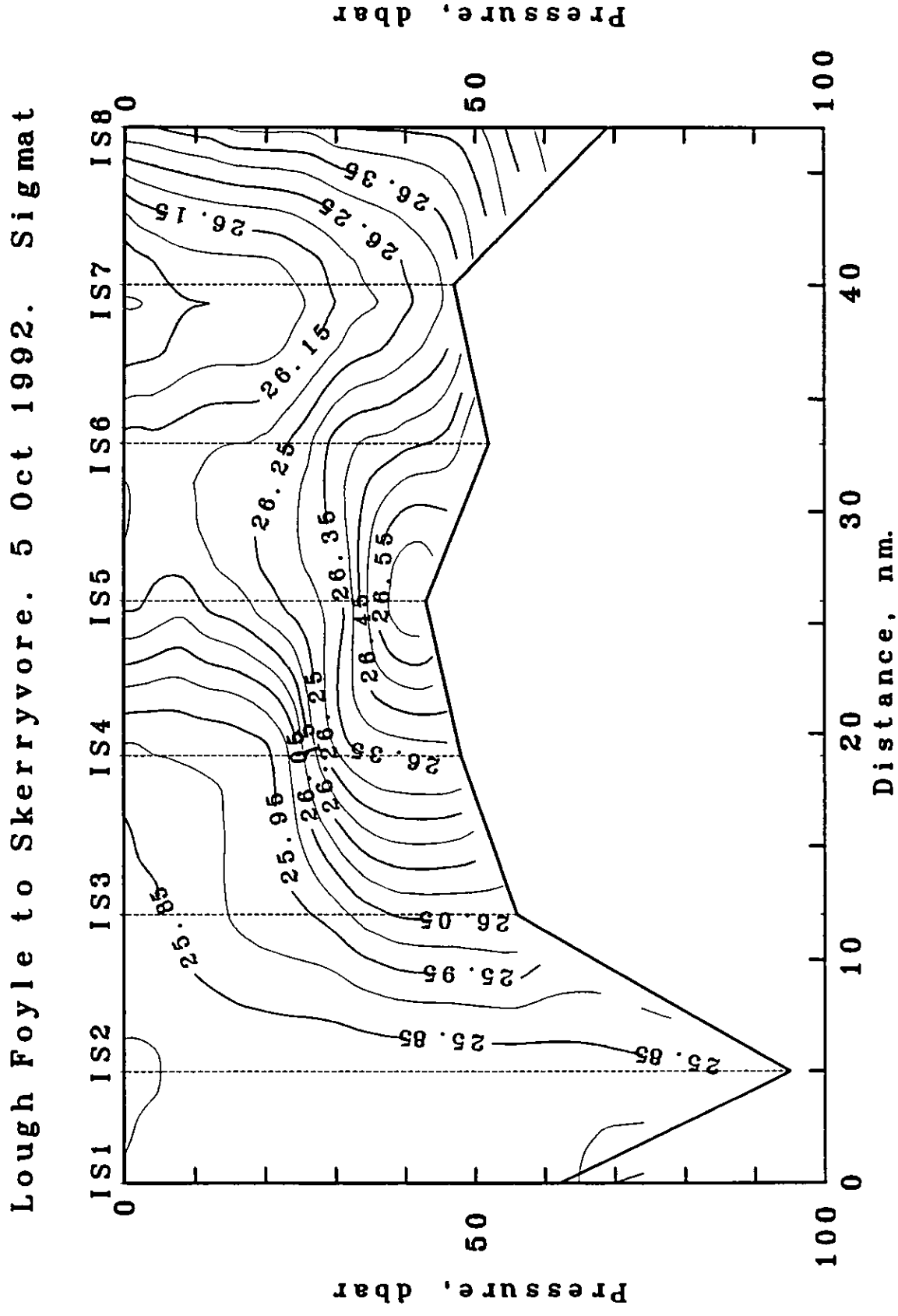
Figure 37



Section from uncalibrated Seabird CTD Figure 38



Section from uncalibrated Seabird CTD Figure 39



Section from uncalibrated Seabird CTD Figure 40